Rethinking *Thinking Schools, Learning Nation*: teachers' and students' perspectives of critical thinking in Singaporean education

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ABSTRACT

One of the key thrusts in Singapore's *Thinking Schools, Learning Nation* (TSLN) educational vision, launched in 1997, is the emphasis on critical thinking in schools. This entails pedagogical changes and challenges for teachers, especially, in terms of their knowledge, dispositions and practices of critical thinking, which are argued to be fundamental in fulfilling the TSLN thrust. Although TSLN is now 10 years into its implementation, to date, there has been little research undertaken to determine the efficacy of the implementation of the critical thinking policy thrust through the perspectives and voices of both teachers and students — the key stakeholders of education and the ultimate agents in the successful implementation of educational initiatives. Therefore, in gaining an in-depth understanding of teachers’ and students’ perspectives of the implementation of critical thinking from the ‘swampy lowlands’, a qualitative case study approach was used. Six government school teachers and their students participated in the case study and data were gathered through lesson observations, interviews, and the analysis of documents.

Findings suggest that a multitude of interrelated systemic and contextual factors, which are predisposed by underlying ‘technocratic and instrumental rationalities’ that govern Singaporean education, remain major barriers to the realisation of TSLN’s critical thinking thrust. The study found that there are gaps and uncertainties in the teachers’ knowledge base of critical thinking and that the incorporation of critical thinking as part of their pedagogy and classroom practice is marginal. Student data corroborate the general lack of emphasis and the limited role of critical thinking in the classroom and they indicate that the hegemony of both school curricula and high stakes examination perpetuate rote learning and didactic pedagogies.

Implications of the study suggest the need to reorientate teacher education and professional development programmes with the explicit aim of transforming teachers’ knowledge base and dispositions to engage with the pedagogical changes that TSLN’s critical thinking policy thrust necessitates. However, to effect deep change and realize the core aspiration of ‘thinking
learners', there must not only be restructuring; reculturing also needs to occur across and beyond the educational system. Importantly, such changes need to be primarily informed by the reconceptualisation of teachers — from mere 'technicians' to 'transformative intellectuals' — and teachers' work — from 'technical work' to 'intellectual work'. It is also vital that teachers who are entrusted with the task of developing 'thinking learners' under TSLN teach curricula and work in school contexts that explicitly encourage, value and reward critical thinking.
DECLARATION

This is to certify that:

I. the thesis comprises only my original work towards the PhD except where indicated,

II. due acknowledgement has been made in the text to all other materials used,

III. the thesis is less than 100,000 words in length exclusive of tables, figures, references and appendices.

[Signature]

Mohammad Akshir Ab Kadir
ACKNOWLEDGEMENTS

The endeavour of completing a task as monumental as a PhD dissertation is one which cannot be done without the understanding, support, love and guidance of others. While completing this dissertation has been a profoundly enriching emancipatory experience, it also brought its fair share of lows. I thank my wife, Andrea, who has always been by my side in this journey — without her sacrifices and understanding, the journey undertaken would have been a more challenging one. I am also especially grateful for both of our family's continuous moral support and prayers. And although my two children, Al-Rayyan and Aaliyah, are too young to fully appreciate the role they have played, I wish to thank them for being the impetus of my ambitions and the strength that kept me going.

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I am also deeply grateful to the teachers and students who participated in the study. Without them affording their valuable time and generously sharing with me their candid thoughts and experiences, this research would not have commenced in the first place. I hope their efforts in lending their voices in this study will go some way in bringing about further positive changes to Singaporean education.

Last, but not least, I thank God who made all of the above and everything else possible.
# TABLE OF CONTENTS

ABSTRACT ......................................................................................................................... I

DECLARATION ................................................................................................................... III

ACKNOWLEDGEMENTS ..................................................................................................... IV

TABLE OF CONTENTS ....................................................................................................... V

LIST OF ABBREVIATIONS AND ACRONYMS USED ................................................... IX

LIST OF TABLES AND FIGURES .................................................................................... XII

CHAPTER 1 ....................................................................................................................... 1

THINKING ABOUT THINKING SCHOOLS, LEARNING NATION .................................. 1

INTRODUCTION TO THE STUDY .................................................................................. 1
BACKGROUND AND THE SIGNIFICANCE OF THE STUDY ............................................. 1
SCOPING THE STUDY: RESEARCH QUESTIONS ............................................................ 7
ORGANISATION OF THE DISSERTATION ...................................................................... 9

CHAPTER 2 ...................................................................................................................... 12

FRAMING THE RESEARCH CONTEXT ........................................................................... 12

PART I ............................................................................................................................... 12

UNDERSTANDING SINGAPORE AND ITS EDUCATIONAL SYSTEM .............................. 14

INTRODUCTION .............................................................................................................. 14
DEFINING CONTEMPORARY SINGAPORE ................................................................ 14
POST COLONIAL SINGAPOREAN EDUCATION: A NEXUS OF POLITICS AND ECONOMICS OVER THE ERAS ......................................................................................... 16
DEVELOPMENTS IN SINGAPOREAN EDUCATION SINCE SELF-RULE ......................... 20
Thinking Schools, Learning Nation: The 'Big Bang' of Educational Reforms .......... 20
IMPLICATIONS OF TSLN FOR SCHOOLS AND TEACHERS ...................................... 27
SUMMARY ...................................................................................................................... 32

PART II ............................................................................................................................ 34

CRITICAL THINKING .................................................................................................... 34

INTRODUCTION .............................................................................................................. 34
CRITICAL THINKING, EDUCATION AND A RAPIDLY CHANGING WORLD ................... 34
DEFINING CRITICAL THINKING: COMPETING CONCEPTIONS ................................ 36
TEACHING CRITICAL THINKING: APPROACHES AND DEBATES ............................. 51
TEACHING THINKING IN SINGAPOREAN EDUCATION .............................................. 63
SUMMARY ...................................................................................................................... 68

PART III ........................................................................................................................ 70

TEACHER KNOWLEDGE AND TEACHER PRACTICE .............................................. 70
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADE</td>
<td>Ability driven education</td>
</tr>
<tr>
<td>CK</td>
<td>Content knowledge</td>
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<tr>
<td>COI</td>
<td>Communities of inquiry</td>
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<td>CoRT</td>
<td>Cognitive Research Trust</td>
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<td>CPDD</td>
<td>Curriculum Planning and Development Division</td>
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<td>CK</td>
<td>Content knowledge</td>
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<td>CTK</td>
<td>Critical thinking knowledge</td>
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<td>CTCK</td>
<td>Critical thinking content knowledge</td>
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<td>CTPK</td>
<td>Critical thinking pedagogical knowledge</td>
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<tr>
<td>CTPCK</td>
<td>Critical thinking pedagogical content knowledge</td>
</tr>
<tr>
<td>DET</td>
<td>Department of Education and Training (Victoria, Australia)</td>
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<tr>
<td>DOE</td>
<td>Desired Outcomes of Education</td>
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<td>DoL</td>
<td>Dimensions of Learning</td>
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<tr>
<td>DoT</td>
<td>Dimensions of Thinking</td>
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<tr>
<td>GCE A</td>
<td>General Cambridge Examinations Advanced Level</td>
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<td>GCE O</td>
<td>General Cambridge Examinations Ordinary Level</td>
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<td>GP</td>
<td>General Paper</td>
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<tr>
<td>HoM</td>
<td>Habits of Mind</td>
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<td>I&amp;E</td>
<td>Innovation and Enterprise</td>
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<td>IT</td>
<td>Information technology</td>
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<tr>
<td>KI</td>
<td>Knowledge and Inquiry</td>
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<td>JC</td>
<td>Junior college</td>
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<tr>
<td>MOE</td>
<td>Ministry of Education</td>
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<td>MoA</td>
<td>Masterplan of Awards</td>
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<td>ML</td>
<td>Mother Tongue</td>
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<td>NIE</td>
<td>National Institute of Education</td>
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<td>P4C</td>
<td>Philosophy for Children</td>
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<td>PAP</td>
<td>Peoples' Action Party</td>
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<td>PCK</td>
<td>Pedagogical content knowledge</td>
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<td>PK</td>
<td>Pedagogical knowledge</td>
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<td>PD</td>
<td>People Developer</td>
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<td>PoLT</td>
<td>Principles of Learning and Teaching</td>
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<td>PSLE</td>
<td>Primary School Leaving Examination</td>
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<td>PW</td>
<td>Project Work</td>
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<td>SEM</td>
<td>School Excellence Model</td>
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<tr>
<td>SCTT</td>
<td>Singapore Centre for Teaching Thinking</td>
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<td>SIS</td>
<td>Specialised independent schools</td>
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<td>SMK</td>
<td>Subject matter knowledge</td>
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<td>SQC</td>
<td>Singapore Quality Class</td>
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<td>TSLN</td>
<td>Thinking Schools, Learning Nation</td>
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<tr>
<td>TLLM</td>
<td>Teach Less, Learn More</td>
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</tbody>
</table>
TPCK  Technological pedagogical content knowledge
VELS  Victorian Essential Learning Standards
LIST OF TABLES AND FIGURES

Tables

Table 1: Summary of selected key educational policies and events in Singapore from 1959-2006 .................................................................................................................. 21
Table 2: Key knowledge domains in pedagogical content knowledge .................. 75
Table 3: Summary information of teacher participants ........................................... 105
Table 4: Summary information of student focus group participants .................... 106
Table 5: Criteria for Classroom Thoughtfulness and Cultural Forces — adapted from Onosko & Newmann, 1994 & Ritchhart, 2002 .................................................. 120
Table 6: Methods, data sources and analysis used in addressing the research questions ................................................................................................................................ 123

Figures

Figure 1: A model of teacher thought and action (Source: Clark & Peterson, 1990, p. 58) ................................................................................................................................. 83
Figure 2: Summary of the key areas framing the study ............................................. 97
Figure 3: Overview of data gathering and frequency ............................................... 114
Figure 4: Overview of strategies used to establish the quality of the study ............. 131
Figure 5: A sketch of Sean ...................................................................................... 137
Figure 6: A sketch of Roy ....................................................................................... 138
Figure 7: A sketch of Nathan .................................................................................. 139
Figure 8: A sketch of Yvonne ................................................................................ 140
Figure 9: A sketch of Evelyn .................................................................................. 141
Figure 10: A sketch of Ivan .................................................................................... 142
Figure 11: Gaps and uncertainties in teachers’ knowledge base ......................... 150
Figure 12: Contextual and systemic factors shape teachers’ knowledge base ......... 170
Figure 13: Teachers’ knowledge base shapes teachers’ practice: a thematic summary ................................................................................................................................. 208
Figure 14: Contextual and systemic factors shape teachers’ practice .................... 242
Figure 15: Classroom experiences shape perceptions of critical thinking .............. 254
Figure 16: Systemic and contextual practices shape students’ perceptions of critical thinking and learning ........................................................................................................ 262
Figure 17: The factors impacting Singaporean schooling and teachers’ and students’ discourse of critical thinking in TSLN ................................................................. 300
Figure 18: The interaction and overlaps of CK, PK, and PCK and CTK result in an emergent knowledge domain, CTPCK (CTPCK) — adapted from Mishra & Koehler (2006)..................................................................................................................314
CHAPTER 1

THINKING ABOUT THINKING SCHOOLS, LEARNING NATION

Introduction to the study

Singapore's landmark Thinking Schools, Learning Nation (TSLN) educational policy was unveiled in 1997 and one of its policy thrusts is the emphasis on critical thinking in schools. In gaining insights into the implementation of critical thinking 10 years after TSLN's inception from key stakeholders' perspectives, this qualitative case study investigated: teachers' perceptions and knowledge of critical thinking; the extent to which teachers incorporate critical thinking in practice; and students' perceptions of critical thinking. Six government school teachers and their classes from each of the three levels of Singaporean education (the primary, secondary and pre-university, or junior college) were invited to participate in the research that adopted a qualitative case study approach (Stake, 1995, 2000, 2006; Yin, 2003, 2009; Merriam, 1998, 2002, 2009). The qualitative case study research methods of lesson observations, teacher interviews, student focus groups, and document analysis were adopted to investigate the implementation of TSLN's policy of emphasizing critical thinking in schools from teachers' and students' perspectives.

Background and the significance of the study

Singapore's Thinking Schools, Learning Nation (TSLN) educational policy, which emphasizes critical thinking in schools as one of its four main policy thrusts (Tan & Gopinathan, 2000), was launched in 1997. To date, there has been little research undertaken to gain an understanding of the progress of the critical thinking policy thrust through the perspectives and voices of the teachers and students — the key stakeholders of education and ultimate agents in the successful implementation of educational initiatives (Fullan, 2001; Hargreaves, 1994; Groundwater-Smith, 2005).

TSLN, described as the 'big bang' of Singaporean education reforms (Gopinathan, 1999), was unveiled by the then Prime Minister, Goh Chok
Tong, in a keynote address at the 7th International Conference on Thinking held in Singapore. As an educational policy in response to the new global challenges in a rapidly changing world, TSLN represented a new shift in the Singaporean educational landscape. In essence, the TSLN vision was described by the Prime Minister as ‘a formula to enable Singapore to compete and stay ahead’ economically (Goh, 1997) and one of the four driving thrusts of the policy is the emphasis on critical thinking in schools (Tan & Gopinathan, 2000).

Educationists across the world argue that a key skill for survival in an ever-changing world is to think critically (Berliner, 2009; Costa, 2001b; Lipman, 2003; Scheffler, 1989; Paul 1995). Paul (1995) in his seminal work argues:

> Critical thinking is the essential foundation for education because it is the essential foundation for adaptation to the everyday personal, social and professional demands of the 21st Century and thereafter. The most inescapable imperative of the future is continuous change ... [T]he distinguishing characteristics of those who will not only survive but thrive in the future, will be abilities and traits, both intellectual and emotional, that entail excellence in evaluating and responding to the conditions of change. (p. xi)

Thus, Singapore’s educational paradigm shift can be attributed to the urgent need of ensuring that Singapore’s citizens of tomorrow are well-equipped to deal with a globalized world that essentially demands the ability to think critically. Underlining the importance between critical thinking and Singapore’s future well-being, Goh (1997) stated in his landmark speech:

> The concept of Thinking Schools is central ... Schools must develop future generations of thinking and committed citizens, capable of making good decisions to keep Singapore vibrant and successful in future ...

And in highlighting the key role schools play in developing critical thinking skills and dispositions in learners, Goh continued: ‘Thinking Schools must be
the crucibles for questioning and searching, within and outside the classroom, to forge this passion for learning among our young' (1997).

With the importance accorded to critical thinking as part of educational reforms, the TSLN initiative clearly responds to educationists such as Paul (1995) who argues that critical thinking 'is the heart of well-conceived educational reforms and restructuring because it is the heart of the changes of the 21st Century' (pp. 97-98). Vast resources in the shape of various initiatives have been channelled into fulfilling this vision since its inception (Koh, 2005; Tan, 2006b; Tan & Gopinathan, 2000). Yet, my recent Singaporean teaching experiences suggest that critical thinking is an ability that is still sorely lacking in the general student population at the junior college phase of the educational ladder — the phase before entrance into university.

In the many formal and informal departmental discussions about preparing students for General Paper (GP), my sentiments were shared by my colleagues in the college English department. GP is an English Language subject taken at the Cambridge Advanced Level Examination. Except for a minority of students who opt for the subject Knowledge and Inquiry (KI)\(^1\) in lieu of GP, GP is a compulsory subject for all other junior college or pre-university students. While GP primarily assesses candidates' English proficiency, it also takes into account their ability to articulate views and knowledge of current regional and global issues. Candidates sit for two papers at the examination — the essay writing and comprehension components. Thus, excelling in GP requires students to possess adequate critical thinking abilities, current affairs knowledge as well as English proficiency.

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\(^1\) KI is a new alternative core subject at pre-university level (years 11-12) which selected candidates can opt for in lieu of GP (MOE, 2005a). Consistent with TSLN's critical thinking objective, KI aims to develop students' spirit of inquiry by exposing them to philosophical issues which compel students to examine critically the epistemological foundations of the various disciplines.
In the regular regional teacher professional sharing seminars, it was evident that my sentiments were also shared by teachers in other junior colleges. This state of affairs concerned me. In spite of TSLN being 10 years into implementation, it struck me that something was amiss. The majority of students who had been taught under the policy for their entire school life and were one examination away from university education appeared to be struggling to think critically — despite the emphasis on critical thinking in schools and learning being one of the main policy thrusts for 10 years. What was or were the reasons behind the apparent lack of critical thinking ability in most students at the final stage of education before university?

Some studies and media reports (e.g. Cheah, 1998; Chong, 2005; Deng & Gopinathan, 1999; Ho & Lin, 2004; Nathan, 2001; Tan, 2003) support my experiences and those of my colleagues, suggesting that the TSLN vision is some way off from realizing one of its objective, which is:

to enable students to acquire and understand core thinking skills and processes, apply skills in learning, decision-making and problem-solving situations and develop habits to become critical, creative and self-regulated thinking learners. (Curriculum Planning and Development Division (CPDD), Ministry of Education of Singapore (MOE), 1998)

As a teacher, this observation became a source of personal and professional concern. If teachers’ thinking and beliefs are a function of their practice, which in turn directly impact on students’ learning outcomes (Clark & Peterson, 1990; Wittrock, 1990), then the links between teachers’ knowledge and their pedagogical actions in the context of implementing critical thinking under TSLN need to be examined. Questions such as ‘Are teachers equipped with the necessary pedagogical knowledge base to teach critical thinking effectively?’, ‘Were there other factors beyond teacher knowledge that impacted the implementation of critical thinking as a key pedagogical aim?’ and ‘What do teachers need to know and need to develop students’ critical thinking?’ warrant investigation. Also of importance are students’ perceptions of critical thinking. Insights to these questions could not only shed light on
how students have come to view the role of critical thinking in their learning, but also of themselves as ‘thinking learners’ in the context of TSLN’s overriding aim of developing future ‘thinking ... citizens’ (Goh, 1997).

Furthermore, the literature of the past two decades suggests that teachers have the greatest impact on student performance (Darling-Hammond, 2000; Wenglinsky, 2000; Clark & Peterson, 1990; Wittrock, 1990). Therefore, questions such as ‘How does the teacher knowledge base of critical thinking affect the way and extent teachers implement critical thinking?’ and ‘How does the extent and manner of implementation ultimately affect students’ perceptions of critical thinking in their learning?’ could provide some insights into why the majority of Singaporean students at the junior college phase of their education have yet to be perceived as ‘thinking learners’ who possess the necessary critical thinking skills and dispositions desired in Singapore’s future ‘thinking citizens’.

In effecting educational change and curriculum implementation, such as is the case with TSLN’s critical thinking emphasis, the importance of teachers has been constantly highlighted (Fullan, 1994, 2001; Hargreaves, 1994; Bascia & Hargreaves, 2001; Darling-Hammond, 2007). For instance, Fullan (2001) points to the three dimensions that are essential in effecting significant educational change. These are: the use of new instructional resources; new teaching approaches; and the reviewing and revising of pedagogical beliefs. In this regard, the effective implementation of TSLN’s aim of developing critical thinking entails changes and challenges for teachers across these three dimensions, especially, in terms of their beliefs and practices. However, I would argue that the knowledge dimension — the teacher knowledge base of critical thinking in the case of TSLN — is also vital in effecting change, as it impacts all the three aforementioned dimensions.

Decades earlier, Shulman (1986, 1987) and his colleagues (e.g. Grossman, 1990; Gudmundsdottir, 1995; Hasweh, 1985) identified the importance of teachers having a sound knowledge base to teach effectively and introduced the seminal notion, pedagogical content knowledge. Similarly, in order to implement the critical thinking thrust in the curriculum effectively and develop
‘thinking learners’, teachers in TSLN ought to possess the necessary knowledge base and dispositions. Some scholars assert that to teach critical thinking effectively, teachers must assume the role of the constructivist teacher (Brooks & Brooks, 2001) or must possess the critical thinking skills and dispositions themselves (Costa, 2001; Page, 2004; Paul, 1995; Ritchhart, 2002; Duffy, 1994). Therefore, the task of teaching critical thinking effectively requires constructivist teachers to not only have the adequate knowledge base of critical thinking, but also the accompanying pedagogical beliefs and critical dispositions.

In the context of TSLN, the lack of the necessary dispositions and knowledge base to teach critical thinking appears to manifest in the lack of change in pedagogy and practice in the classroom. Some Singaporean scholars (e.g. Gopinathan, 2007; Nathan, 2006; Tan, 2007) have suggested that the changes aspired by TSLN may not be truly occurring. Gopinathan (2007), for instance, writes:

...at the school level, change, while it is occurring, is not yet fundamentally changing pedagogy and practice. Teachers having to cope with large classes, a content dominated curriculum and high stakes examinations have taken on initiatives like thinking skills but rather than allow for a reconceptualisation of practice have, in many cases, bolted on acceptable elements and routinised procedures ... (p. 67)

Similarly, Hoare (2006), in the course of her doctoral study related to Singaporean education, found that the change demanded by TSLN is far from smooth in the face of evidence about resistance to the reforms. She cites the case reported by an educator from the National Institute of Education (NIE), Singapore’s only teacher education provider, who found that teachers were still inclined to the practice of ‘over teaching’ and ‘over drilling’ in the aim of helping their students to anticipate exam questions (Tan, 2003). Worryingly too, it was found that teachers and parents still favoured these traditional didactic strategies of intensive and repetitive coaching practice that
have worked in the past, giving credence to Gopinathan's (2007) observations.

Thus, if Singapore's Ministry of Education (MOE) sees critical thinking as a key skill for its future citizens' active participation in a rapidly changing world and as one of the pillars of its reformed educational system (Goh, 1997; Ng, 2008), the way scholars and educators have championed it (e.g. Dewey, 1938; Giroux; 1984, 1985, 2004; Paul, 1995; Scheffler, 1989), then the previously mentioned questions such as 'How does the teacher knowledge base of critical thinking affect the way and extent teachers implement critical thinking?' need to be examined. Insights into the progress of TSLN's aim of developing 'thinking learners' and the extent of its intended change from the perspectives of those on the frontlines of education — teachers and students — are essential.

This research is also significant as it fills a gap in the literature. A review of the relevant literature reveals a paucity of studies that bring together the areas of critical thinking and teacher knowledge. In light of the growing importance of critical thinking in contemporary education (Berliner, 2009; Brandt, 2001, Noddings, 2008; Lipman, 2003), I argue that there is an urgent need to better understand the links between the teacher knowledge base and teachers' implementation and practice of critical thinking in the classroom. Furthermore, an understanding of students' perceptions of critical thinking and the role students perceive critical thinking to play in their learning will also be instructive. Insights into these aspects have the potential to provide a better understanding of the teacher knowledge base required for the effective enactment of critical thinking curricula, the identification of the larger attendant factors that impact teacher knowledge and practice, as well as some understanding of how these factors shape students' perceptions of critical thinking.

**Scoping the study: research questions**

As the previous discussion foregrounds, the purpose of this study is to gain insights into:
• teachers’ perceptions and knowledge base of critical thinking and the extent to which teachers implement critical thinking in their teaching; and

• students’ perceptions of critical thinking.

In particular, I seek to understand the ways teachers understand critical thinking, their knowledge base of it, how they have come to acquire the knowledge, and the manner and extent to which critical thinking is implemented in their teaching. I also aim to gain an insight into how students perceive critical thinking, that is, the role they perceive it plays in their learning and how they perceive themselves as ‘thinking learners’.

However, while I recognize that the study can be undertaken from a number of perspectives and through different theoretical lenses, my study is concerned with examining the issues primarily within the theoretical framework that involves teacher knowledge. More specifically, that which is based on pedagogical content knowledge (PCK) (Abell, 2008; Berry, Loughran & van Driel, 2008; Cochran & DeRuiter, 1998; Gudmundsdottir, 1995; Grossman, 1990; Hasweh, 2005; Nilsson, 2008; Shulman, 1986, 1987) and teacher practice in the context of critical thinking. This emphasis is especially relevant given my prior experiences as a teacher in the Singaporean educational system and my longstanding interest in critical thinking that has been engendered by my affinity to the subject which embodies critical thinking like no other — philosophy. Thus, the scope of the study is defined by these considerations.

In relation to the purpose and scope of the study, the broader aim is to gain a better understanding of the progress of TSLN’s critical thinking policy thrust at the school and classroom levels, and, in the course of doing so, learn of the possible barriers that impede the effective implementation of critical thinking from Singaporean teachers’ and students’ perspectives. The ultimate objective is to offer recommendations for refining the critical thinking initiative under the TSLN vision in terms of teacher education and professional development, linking these to the broader discourses on educational change in the Singaporean educational context.
Thus, the following research questions guide the study:

1. What are teachers' perceptions and knowledge base of critical thinking?
2. How and to what extent do teachers implement critical thinking in their classroom?
3. What are students' perceptions of critical thinking?

Informed by a qualitative methodology further discussed in Chapter 3, these research questions are examined through a broad framework which brings together the literature on Singaporean education, critical thinking and teacher knowledge.

Drawing on the conceptual framework which is further explicated in Chapter 2 and augmented by my prior Singaporean teaching experiences, I argue that it is the gaps and uncertainties in teachers' knowledge base and their limited practices of critical thinking, which are impacted by larger systemic and contextual factors, that remain major barriers to the realisation of TSLN's critical thinking thrust. Consequently, given the links between teachers' actions and students' thoughts (Clark & Peterson, 1990; Wittrock, 1990), it is teachers' knowledge and practice together with the attendant systemic and contextual factors that ultimately impact students' perceptions of critical thinking.

**Organisation of the dissertation**

The organisation of the dissertation is primarily informed by the notion 'methodological congruence' (Morse & Richards, 2002) in which 'the purposes, questions, and methods of research are all interconnected and interrelated so that the study appears as a cohesive whole rather than as fragmented, isolated parts' (Creswell, 2007, p. 42). Thus, despite some organisational variations from the conventional thesis structure, it is the need to achieve this sense of coherence and unity that has guided the writing and structure of the chapters in this dissertation.

Following this chapter, which presents the background, significance and rationale of the study, Chapter 2 frames the research context which is key in
addressing the research questions in greater detail. This primarily entails the framing of 'the system of concepts, assumptions, expectations, beliefs and theories that supports and informs [the] research' (Maxwell, 2005, p. 33). Given that this, in effect, comprises various but interlinking dimensions, Chapter 2 is divided into four parts. Part I explicates the Singaporean educational context and ends with the explication of the TSLN policy and its critical thinking policy thrust, which is the focus of the study. Part II moves to the discussion of critical thinking in which I also argue for an expansive view of critical thinking.

Part III focuses on teacher knowledge and, in particular, reviews the concept of pedagogical content knowledge (PCK) and discusses its appropriateness as a heuristic tool to apprehend the notion of the teacher knowledge base in the context of teaching critical thinking. Previous works on teacher knowledge and teacher actions in the literature are also reviewed, framing yet another key aspect of the research context. The final part of the chapter combines the two key areas of this study — critical thinking and teacher knowledge — and the limited body of research that links them both.

Chapter 3 discusses the qualitative research methodology that frames my approach to the study and explicates the qualitative case study design and the research methods. The research sites and the participants are also identified and the data gathering techniques and analysis discussed. I conclude the chapter with a discussion of the criteria used to establish the quality of the study.

Chapter 4 first provides the background information about the teacher participants relevant to the study. As a prelude to the discussion of the findings, summative descriptions and a sketch of each teacher's pedagogical beliefs are foregrounded. The chapter then examines the data relating to the teacher participants. Using the conceptual framework established in Chapter 2, teachers' knowledge and perceptions, and practices of critical thinking are discussed in this chapter and in Chapter 5, addressing the first two research questions respectively. And in addressing the third and final research
question, Chapter 6 is devoted to the discussion of findings pertaining to the student participants.

Chapter 7 revisits the background and significance of the study and synthesises the study's key findings. The implications of these findings for TSLN's critical thinking policy thrust are discussed in light of the discourses on educational change and recommendations relating to the policy are proposed. The chapter also highlights the contributions the study makes and suggests a number of directions for future research in the field. Finally, some reflections on the research process and my engagement with the study are presented.
CHAPTER 2

FRAMING THE RESEARCH CONTEXT

Introduction

In Chapter 1, I presented the background of the research situating this in the TSLN context, and explained the study's rationale and significance. The research questions that guide the study were also introduced. In Chapter 2, I explicate the research context which effectively calls for the framing of 'the system of concepts, assumptions, expectations, beliefs and theories that supports and informs [the] research' (Maxwell, 2005, p. 33). This entails the discussion of somewhat distinct but interlinking areas, and in facilitating this task, the chapter is divided into four parts.

Part I provides the essential background about Singapore and its educational system. This incorporates a brief historical discussion of Singapore and its socio-political context, and the examination of the developments in the Singaporean educational system. This discussion offers a platform for a broader understanding of the rationale and aims of the TSLN initiative and the larger educational context in which the teacher and student participants are situated. Thus, while this task suits a more informative and expository stance, the section ends with a critical account of the implications of TSLN's critical thinking thrust for schools and teachers.

Given that critical thinking is one of the key policy thrusts in TSLN and the concern of the study, Part II moves to the discussion on critical thinking. Questions such as 'What does critical thinking mean?', 'What does teaching thinking entail?' and 'What are the constraints of thinking instruction?', which are germane to the study, guide the review. Here, I also argue for an expansive view of critical thinking that aids my study of teachers' and students' perceptions and enactment of critical thinking. Furthermore, in connecting with the Singaporean educational context, Singapore's initiatives in relation to thinking instruction are discussed.
Part III focuses on teacher knowledge. It examines the seminal notion of pedagogical content knowledge (PCK) which forms the basis of the study's emergent analytical framework of teacher knowledge and practice of critical thinking. Part III also reviews the literature that studied the links between teacher knowledge and beliefs, and teacher actions.

Part IV discusses the combined domains of critical thinking and teacher knowledge — a field that has received little attention in the literature and one to which this study also aims to contribute. Previous studies are reviewed and a framework used for the study of teacher knowledge and practice in the context of teaching thinking is examined.
PART I

UNDERSTANDING SINGAPORE AND ITS EDUCATIONAL SYSTEM

Introduction

Although Singapore is a young nation that achieved independence less than 50 years ago, a comprehensive review of Singapore is beyond the scope and purpose of this study. This literature review is instead informed by the aim to provide a general understanding of contemporary Singapore and its educational landscape in which particular attention is devoted to a discussion of the educational policy Thinking Schools, Learning Nation (TSLN).

Defining contemporary Singapore

Since gaining independence in 1965, the Singapore story has been one of spectacular economic growth and success against seemingly insurmountable odds led by the one dominant political party, the People's Action Party (PAP) and Lee Kuan Yew — Singapore's first Prime Minister, first Senior Minister and, currently, its first Minister Mentor. To some extent, the history of Singapore post independence has thus been very much the history of Lee Kuan Yew and the PAP (Hong & Huang, 2008).

Today, Singapore, once listed as one of the 'miracle economies' in East Asia by the World Bank in 1993, stands among the wealthiest nations in the world. It is a leading economy in Southeast Asia and Asia despite having a land area of just under 700 square kilometres with no natural resources. Singapore's current population is around 4.59 million and being a heterogeneous society since the 19th century, this population is made up of the historical ethnic groups — the Chinese, the Malays, the Indians, the Eurasians and other racial groups who respectively constitute 74.7%, 13.6%, 8.9%, and 2.8% of the population (Singapore Department of Statistics, 2009).

Singapore's standard of living has been rising since its independence and it ranks very highly by all benchmarks of economic quality of life (Neher, 1999).
However, amidst its unprecedented economic success, Singapore has been described as a ‘puzzle’ (Haas, 1998) and a ‘paradox’ (Trocki, 2006). For instance, while it is viewed as a free-trade capitalist economy, it is also seen as ‘one of the most intensely policed and closely controlled countries in the world’ in which economic prosperity and material affluence are ‘paid for in intellectual and cultural sterility’ (Trocki, p. i). Although it is among the most prosperous nations in the world and with the highest salaried government leaders, it wanted the trade terms granted to the poorest countries (Haas, 1999). In sum, Haas (1999) portrays Singapore as a country with a range of contradictions or, as he puts it, ‘puzzles’ — economic, social, cultural — and the ‘most intriguing mystery of all is Lee Kuan Yew’ (p. 7). Nonetheless, given its economic and political success, especially, Singapore is seen by ‘the peoples of both developing and industrialised countries as “the nation that works”’ (Neher, 1999, p. 39).

Next to an efficient government under Lee’s stewardship, the factor behind Singapore’s economic success is its people, who are seen as the primary resource and perceived as ‘overwhelmingly committed’ with ‘a work ethic famous throughout the world’ (Neher, 1999, p. 42). This is no accident. From the time PAP came into power in 1959, education had been articulated as being instrumental in the creation of a skilled workforce for the nation’s rapid industrialisation (Gopinathan, 2007; Tan, 2005).

Gopinathan (1999) highlights this nexus between politics, economics and education when he concurs with Castells’ (1988) characterisation of Singapore as a ‘developmental state’ that has always looked ‘to economic growth and the provision of opportunities to its citizens to anchor its claim to legitimacy’ (Gopinathan, 1999, p. 296). Like other developmental states in East Asia such as Taiwan, Hong Kong and South Korea, I argue that the Singaporean government sought, and still seeks, this legitimacy through the creation and the sustaining of economic prosperity.

A fundamental policy behind the developmental state is the enactment of educational policies and the creation of human capital. It is this human capital that is seen as the mobilizing factor behind economic progress and prosperity.
in which the economic returns for the government’s outlay on education justified further investment in the sector (Gopinathan, 1999, 2007). The achievement of such economic progress in a developmental state, according to Gopinathan (1999, 2007), necessitated the government’s dominant role in education. This led to the creation of a ‘centrally planned, universally available, standardized and state driven education system, which created the national subjectivities necessary for the affiliation to the state’s modernization project’ (p. 57). Elsewhere, almost a decade earlier, Gopinathan and Ho (1999) suggest that the economic transformation of the state ‘could have only been possible with a deliberate application of economic and social management principles and a workforce properly equipped to support the transformation’ (p. 100). And the PAP under Lee has indeed been the force behind such deliberate management.

Post colonial Singaporean education: a nexus of politics and economics over the eras

It is unsurprising that in light of the post independent historical and political contexts previously discussed, the administration of education in Singapore is a heavily centralized enterprise. Much authority resides with the government through its Ministry of Education (MOE). As the authority on education, MOE holds jurisdiction over: curriculum; educational structure; examinations; teacher qualifications; and the eligibility to teach and the conditions of service (Gopinathan, 2001).

From the time of self-government, education has consistently been viewed as ‘an investment in human resource development’ (Ho & Gopinathan, 1999, p. 102). Schools, in particular, are seen as ‘sites for the preparation of the country’s labour force, preparation for social participation, for political and social identity formation, and for the production of national elites’ (Gopinathan, 2007, p. 60). The link between education and the economy has consistently been made explicit by government leaders. For instance, a previous minister of education stated:

One of the key factors which must guide our education system in future years must be to ensure that our education system remains
relevant to the type of economy in which our children will have to find employment when they leave school. (Tan, 1986)

Education in multi-ethnic Singapore, as its history has shown, also has a key role in maintaining social cohesion and nation-building. Another former education minister highlighted this importance:

Education ... must do more. The first and ... most important is to equip our students with the fundamental values about our society, what we stand for, and the capacity to think for themselves ... But our students should understand why we have become a nation, and how we have survived and built a reasonably good life for ourselves. (Teo, 1998)

The narrative that Singaporean education serves two fundamental national needs — economic growth and social cohesion (Tan, 2006a; Tan, 2007, 2008; Ho & Gopinathan, 1998) — can be illustrated by the developments in Singaporean education from the period of self-rule in 1959 to the present era. However, to better understand these developments, it is instructive to provide briefly a broad sense of the philosophies and ideological tenets that have underpinned Singaporean education and informed its initiatives over the phases in the years beginning in 1959 to the current era.

**Understanding the philosophies and ideology of Singaporean education**

In the context of her discussion in understanding the different educational phases, Tan (2006a) points to two major philosophies advanced in Western philosophy that have underpinned the educational developments in Singapore from its time of self-rule: realism and pragmatism. The classical ideas of realism can be dated back to Aristotle and Aquinas. This philosophy was further developed by Bacon and Locke in the 17th century, while contemporary realism has been influenced by the works of Russell, Putnam and Searle (Ozmon & Craver, 2003). However, the fundamental thread of realism is possibly the notion that ‘reality, knowledge, and value exist independently of the human mind’ (Ozmon & Craver, 2003, p. 48). Given that there are consequently numerous notions and manifestations of realism in
education, Tan (2006a) highlights some of the fundamental assumptions that characterise realism in contemporary education in the Singaporean context.

- Schools are seen as academic institutions that develop students’ abilities in reasoning, observation and experimentation in which they are trained to serve the economy.
- The curriculum is highly systematic and structured with different subject disciplines.
- Students begin education with the basic skills of reading, writing, arithmetic, and moral values, before moving on to domain specialisations.
- Students streamed according to academic ability — a liberal education in the Arts and Sciences is provided for the academically able, while vocational training is given to the weaker ones.
- Quantifiable benchmarks are used for the assessments of teachers and students.
- The teacher is seen as an expert in the subject area and in the teaching of the subject to students and in their assessment.
- The teacher focuses on what is important in the development of student reasoning to allow the acquisition of knowledge of the natural world. (p. 134)

Tan (2006a) also suggests that pragmatism underpins Singaporean education. Pragmatism is generally viewed as the product of American philosophy and shaped by the works of Peirce, James and Dewey and, like realism, it originated from ancient Greek philosophy (Ozmon & Craver, 2003). It is a philosophy that essentially 'encourages us to seek out the processes and do the things that work to help us achieve desirable ends' (Ozmon & Craver, 2003, p. 127). In making the case that Singaporean education is also shaped by a pragmatist philosophy, Tan (2006a) delineates some of its salient manifestations in education:
• Schools transcend the role of academic institutions that develop students cognitively. They are sites for active learning where the experimentation with novel ways of thought and practice and the construction of social consensus take place.

• The learning and teaching process is student-centred and informed by students' interests and needs.

• The curriculum is broad and cross-disciplinary, and not strictly defined according to specific subjects.

• The teacher is seen as the facilitator who guides student active learning in which students are developed through the empowerment of knowledge, abilities and inclinations which predispose them to make educated life decisions. (p. 134)

Apart from the influence of realist and pragmatist philosophies, it can be argued that Singapore's education system is premised on a number of key ideological principles. The precepts that inform the Singaporean government's overarching educational ideology are: the direct relationship between education and the economy; the equality of opportunities and meritocracy in education; and the belief that the provision of education must be accompanied by the development of character (Ho & Gopinathan, 1999). Character development, rooted in cultural and national mores, echoes a Confucian ethos which Lee propagates. Being a multiracial country, these mores are also encapsulated in the Singapore Shared Values which are aimed at maintaining social cohesion, cultural identity and nation-building in the course of pursuing economic prosperity (Gopinathan, 2007; Tan, 2006a). Following a White Paper in 1991, the following values were adopted:

• nation before community and society over self

• community support and respect for the individual

• the family as the basic unit of society consensus in place of conflict

• racial and religious harmony.

(Tan, 2001)
Developments in Singaporean education since self-rule

The educational developments in Singapore during the period of 1959 to the present era can be understood as consisting of three phases: the ‘survival phase’ that begins from 1959 to 1978; the ‘efficiency driven phase’ that spans from 1979 to 1996; and the ‘ability driven phase’ which is from 1997 to 2006 (Tan, 2006a). In providing a succinct picture of these developments in Singapore, Table 1 presents a timeline of selected key events and educational policies.

The ‘survival phase’ is characterised by educational policies that were geared towards the creation of social cohesion, racial equality and national identity. Singapore only achieved self-rule in 1959 from the British and such policies were clearly aimed to achieve internal national stability in a time that saw much communal and racial strife.

However, the ‘efficiency driven phase’ in Singaporean education was seen more as the ‘fine-tuning’ of the educational system that was in this period considered to be ‘inefficient’ against the changing economic times (Ho & Gopinathan, 1999; Tan, 2006a). More broadly, policies that were implemented in this period were intended to prepare a more competitive workforce. Among others, this period saw a number of initiatives that worked towards the development of innovation and creativity in schools. Finally, the ‘ability driven phase’ culminated into the launch of the landmark policy, Thinking Schools, Learning Nation. Given the focus of the study on this policy, it is now discussed in greater detail.

Thinking Schools, Learning Nation: the ‘big bang’ of educational reforms

The seeds of educational change that led to Thinking Schools, Learning Nation (TSLN) could be seen to be first sowed in the 1980s with initial moves towards innovation and creativity in the shape of the establishment of independent and autonomous schools. The previous policies beginning from the late 1970s onwards addressed the nation’s structural change in which classroom practices were largely unaffected.
<table>
<thead>
<tr>
<th>Phase</th>
<th>Year</th>
<th>Policy/ Events</th>
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<tbody>
<tr>
<td><strong>Survival phase:</strong></td>
<td></td>
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<tr>
<td>educational policies geared towards the</td>
<td>1959</td>
<td>People’s Action Party (PAP) came into power, Singapore gained political autonomy</td>
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<td>creation of social cohesion, racial</td>
<td></td>
<td></td>
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<tr>
<td>equality and national identity</td>
<td>1960</td>
<td>Compulsory bilingualism introduced at primary school level</td>
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<tr>
<td></td>
<td></td>
<td>First integrated secondary schools established</td>
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<tr>
<td></td>
<td></td>
<td>- students in different language streams housed under one roof</td>
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<tr>
<td></td>
<td>1963</td>
<td>Singapore's merger with Malaysia</td>
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<td></td>
<td>1965</td>
<td>Singapore separated from Malaysia and gained independence</td>
</tr>
<tr>
<td></td>
<td>1966</td>
<td>Compulsory bilingualism policy introduced at secondary school level</td>
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<tr>
<td><strong>Efficiency driven phase:</strong></td>
<td></td>
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<tr>
<td>fine-tuning’ of educational system</td>
<td>1979</td>
<td>Report on the Ministry of Education (MOE) 1978</td>
</tr>
<tr>
<td>considered to be ‘inefficient’ against the</td>
<td></td>
<td>- noted bilingual policy failure, high dropout rates, high failure rates in national examinations</td>
</tr>
<tr>
<td>changing economic times; policies</td>
<td></td>
<td>- recommended streaming at end of primary three into ‘Normal’, ‘Extended’ and ‘Monolingual’ and end of</td>
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<tr>
<td>intended to prepare a more competitive</td>
<td></td>
<td>primary six into ‘Special’, ‘Express’, ‘Normal (Academic)’ streams (see Singapore Education Landscape in Appendix 5)</td>
</tr>
<tr>
<td>workforce; gradual move to greater</td>
<td>1979</td>
<td><em>Special Assistance Plan Schools</em> established to cater to high performing students</td>
</tr>
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<td>autonomy and innovation in government</td>
<td>1980</td>
<td>Curriculum Development Institute of Singapore (CDIS) established</td>
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<td>schools</td>
<td>1984</td>
<td><em>Gifted Education Programme</em> for high-achieving students started in a few primary and secondary schools</td>
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<td></td>
<td>1987</td>
<td>Towards Excellence in Schools Report</td>
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<td></td>
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<td>- granted selected schools autonomy to foster creativity and innovation</td>
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<td></td>
<td>1987</td>
<td>de Bono’s <em>CoRT (Cognitive Research Trust)</em> programme introduced in some schools; a precursor of the Thinking Programme</td>
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<td></td>
<td>1988</td>
<td>Independent schools established for greater school autonomy</td>
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<tr>
<td>Year</td>
<td>Event</td>
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</table>
| 1991 | Improving Primary School Education Report  
- revision of streaming policy at primary and secondary levels  
- ensuring minimum of 10 years of education for all students |
| 1994 | Autonomous schools established for greater school autonomy |
| 1996 | *Thinking Programme* piloted in some secondary schools |
| 1997 | Thinking Schools, Learning Nation (TSLN) launched |
| 1998 | Desired Outcomes of Education published — part of TSLN’s initiatives |
| 1999 | *Thinking Programme* introduced to all secondary schools — part of TSLN’s initiatives |
| 2000 | Schooling for six years made compulsory  
*School Excellence Model* and awards system introduced — part of TSLN’s initiatives |
| 2002 | Report of the Junior College/ Upper Secondary Education Review Committee — part of TSLN’s initiatives  
Revamp of GCE Advanced Levels curriculum for creative and critical thinking skills — part of TSLN’s initiatives |
| 2003 | Singapore Centre for the Teaching of Thinking (SCTT) established — part of TSLN’s initiatives  
Launch of *Innovation and Enterprise* (I&E) — part of TSLN  
*Project Work* introduced at junior college/ pre-university level — part of TSLN’s initiatives |
| 2004 | *Teach Less, Learn More* introduced by prime minister— part of TSLN’s initiatives  
*Singapore Sports School*, an SIS, opened to cater to students excelling in sports |
| 2005 | *NUS High School for Maths and Science*, an SIS, opened to cater for high-achieving students |
| 2006 | *Knowledge and Inquiry* introduced at junior college/ pre-university level — part of TSLN’s initiatives |
| 2007 | Some secondary schools offer different curricula and examinations such as the *International Baccalaureate* |
| 2008 | *School of the Arts*, an SIS, opened to cater for students who excel in the Arts  
- issuing of *School Graduation Certificates* that reflect students’ academic and non-academic achievements. |

(Adapted from Tan, 2006)
However, the ‘big bang’ (Gopinathan, 2001, p. 28) in educational reforms in Singapore occurred in the 1990s which saw a comprehensive review of the whole educational system from pre-school to the university level. The review saw the unprecedented active participation of university academics and other education personnel in the revamp of educational initiatives (Gopinathan, 2001).

It could be argued that the dramatic policy changes in Singaporean education were not entirely surprising. Given the backdrop of contemporary debates on the essential aims of education in an ever globalizing world on the one hand, and Singapore’s realist educational philosophy on the other hand (Tan, 2006a), school leavers were increasingly expected to be equipped with a new repertoire of skills to serve the new economy. The emergence of the knowledge-based economy saw the traditional teacher-centred and content-driven educational system gradually becoming obsolete. In regard to this, Brown and Lauder (2001) contend that ‘the learning model of the mass production of goods and services has become a source of ‘trained incapacity’ in a knowledge-driven economy’ (p. 114).

It was precisely in response to this new global challenge that Singapore’s second Prime Minister, Goh Chok Tong, laid down the new agenda for both education in Singapore and the nation, and thus began Singapore’s education revolution in 1997:

A nation’s wealth in the 21st Century will depend on the capacity of its people to learn. Their imagination, their ability to seek out new technologies and ideas, and to apply them in everything they do will be the key source of economic growth ... We want to have an environment where workers and students are all the time thinking of how to improve. Such a national attitude is a must for Singapore to sustain its prosperity ... Thinking Schools, Learning Nation... is a formula to enable Singapore to compete and stay ahead. (Goh, 1997)

Alongside the TSLN vision was the formulation of the education ministry’s mission statement Moulding the Future of the Nation and its revised
educational goals were encapsulated in *Desired Outcomes of Education* (DOE). The DOE are based on the 'Asian' notion of education and they delineate the key learning outcomes at the different levels and pathways in the educational system (see Appendix 5 for an overview of DOE's key learning outcomes). With these, MOE sought to deliver a holistic education in which a variety of skills, values and attitudes are acquired over the different phases of education — primary, secondary and pre-university. Tan (2007) sums up the aim behind TSLN in relation to the economic imperative and his comments underscore the significance for the study in attempting to gain an insight into the progress of the critical thinking objective under the TSLN policy:

> [TSLN] aimed at ensuring that all students would leave the school system with a life-long passion for learning as well as with critical and creative thinking skills in order that they might better adapt to the needs of the knowledge-based economy. (p. 308)

To complement this new educational initiative, several other major initiatives were also introduced as part of the educational arsenal to meet the challenge of a new world context. The IT (Information Technology) Masterplan, for instance, was aimed at transforming the learning environment of students and equipping them with the 'critical competencies and dispositions' to succeed in a knowledge economy (MOE, 2008b). Meanwhile, the National Education initiative was intended to develop national cohesion and cultivate a sense of belonging and emotional rootedness to Singapore (MOE, 2006). In sum, the government perceived the future as one that not only required thinking abilities of citizens, but also one that demanded them to be IT savvy, to think global but to feel rooted to the homeland.

Together with the *Thinking Schools* vision, the above initiatives were the key pillars of the new comprehensive curriculum and constitute the four major policy thrusts driving TSLN. These are:

- critical and creative thinking;
- the use of IT in education;
• national education; and
• administrative excellence. (Gopinathan, 2001, 2007)

These four thrusts constitute TSLN as a whole, but it is the emphasis on critical thinking that this study seeks to explore. While it might seem that the focus on critical thinking ignores creative thinking, this is not the case. Although TSLN makes a distinction between creative and critical thinking, in this study, they are seen as ‘inseparable, integrated, and unitary’ (Paul, 1995, p. 195). Taking the notion of creative thinking in the broad sense as Paul (1995) does, creativity in thinking is viewed as ‘making, as a process of creating thought — a process that brings thoughts into being to organise, shape, interpret, and makes sense of the world’ (Paul, 1995, p. 198; emphasis in original). Criticality is considered the process of ‘judging’ and ‘assessing’. Thus, in the integrated perspective adopted, the act of thinking well, or excellence in thought, requires practically all of the time for the mind to both produce and assess synchronously. In this regard, critical thinking is a necessary component of creative thinking and is ‘inseparable’ from it. In other words, ‘creativity presupposes criticality and criticality creativity’ (Paul, 1995, p.198). Hence, in this sense, the focus on critical thinking, ipso facto, also encompasses creative thinking as discussed.

The importance of critical thinking is underlined in Goh’s vision of Thinking Schools as schools that are ‘the crucibles for questioning and searching, within and outside the classroom, to forge this passion for learning among our young’ (1997). Furthermore, TSLN’s thinking thrust in the development of ‘a critical and creative thinking culture within schools’ include:

• the explicit teaching of critical and creative thinking skills;
• the reduction of subject syllabi content;
• the revision of assessment modes; and
• a greater emphasis on processes instead of on outcomes when appraising schools. (Tan & Gopinathan, 2000, p. 9)
In addition, a ministry commissioned panel outlined a number of recommendations that included the reduction of curriculum content and review of examination questions. These recommendations were followed by a slew of ministerial initiatives under the TSLN framework. First, to incorporate critical thinking in the classroom, the content of all subjects was reduced by 30% (Davie 1998; MOE, 1998), as the panel found that teachers were over-teaching and the syllabuses had much unnecessary information. Reviews in the testing and assessment were also made to include critical thinking (MOE, 1998). The emphasis of assessment and testing was on students' abilities to learn, apply and process knowledge instead of their ability to recall information. Project Work (PW) was also seen as a key assessment component. Its objectives were to develop students' sense of independent learning, collaboration and resourcefulness. PW was also seen as providing students with the opportunity to synthesise different areas of knowledge and to critically and creatively apply them to real life situations (MOE, 2006). To stress the importance of PW, students' scores have been included in the admission criteria to local universities since 2004 (MOE, 1999). Emphasising the importance of critical thinking under TSLN and its related initiatives, MOE thus stresses that '[t]eaching will be focused on developing understanding, critical thinking and the ability to ask questions and seek answers and solutions' (undated, p. 6).

Since TSLN was implemented, other initiatives were also introduced over the years to progress the policy. These include Innovation and Enterprise (I&E) and Teach Less, Learn More (TLLM) initiatives that continuously stress the importance of placing the learner as the centre of education. They echo similar messages in their focus on self-directed learning, which veer away from didactic instruction and rote learning, and, more importantly, the need to change attitudes and mindsets.

I&E emphasized the importance of creativity and resourcefulness in learning, and 'placed a stronger focus on nurturing a spirit of Innovation and Enterprise ... [that] ... would help to build up a core set of life skills and
attitudes ... and promote the mindsets that we want to see in our students, teachers and school leaders' (MOE 2006). TLLM according to MOE:

would mean less dependence on rote learning, repetitive tests and a 'one size fits all' type of instruction, and more on experiential discovery, engaged learning, differentiated teaching, the learning of life-long skills, and the building of character through innovative and effective teaching approaches and strategies. More opportunities are being created for holistic learning so that students can go beyond academic excellence to develop the attributes, mindsets, character and values that would be critical to successful living. (MOE, 2006)

Both I&E and TLLM are viewed as subsequent extensions of the TSLN vision. While I&E builds on TSLN, TLLM builds on the groundwork laid in place by the improvements made under the TSLN vision, as well as the mindset changes encouraged in our schools under I&E' (MOE, 2006). More recent changes include the revamp of the year 11-12 curriculum structure and the introduction of a new alternative core subject at pre-university level (years 11-12), Knowledge and Inquiry (KI) (MOE, 2005a), which candidates can opt for in lieu of General Paper. Consistent with TSLN’s critical thinking objective, KI aims to develop students’ spirit of inquiry by exposing them to philosophical issues which compel students to examine critically the epistemological foundations of the various disciplines.

The significant strategies and initiatives linked to developing critical thinking aim to change teachers’ practice and the manner in which students’ learn. It is in this context that the study seeks to understand teachers’ and students’ perceptions and practice of critical thinking. Insights into these, 10 years on after the explicit introduction of critical thinking into the educational system, could provide an understanding of the progress of TSLN’s critical thinking policy thrust from the school and classroom levels.

**Implications of TSLN for schools and teachers**

The launch of TSLN clearly marked the beginning of a shift towards a realist-pragmatist educational paradigm (Tan, 2006a; Tan, 2007), increasingly
incorporating the elements of progressive education. The TSLN era also saw an increasing decentralisation of education in Singapore, as illustrated by the growing autonomy given to schools (Tan, 2008). However, the accorded autonomy that is part of decentralisation is not aimed at the democratisation of schools. Rather, Tan (2008) suggests that it is ‘associated with a pragmatic consideration to facilitate reform to meet economic challenges’ (p. 9).

Furthermore, Tan (2008) points out that, in the Singaporean context, such decentralisation is aimed at encouraging innovation in schools and is one that also leads to ‘rationalisation and efficiency in schools where schools behave more like businesses in a marketplace’ (Karlsen, 2000, p. 9). This can be attributed to the call for schools to develop themselves into ‘excellent schools’ under the TSLN vision in pursuit of one of its four thrusts — administrative excellence. Ng (2003) states:

[S]chools in Singapore are now asked to develop themselves into excellent schools. They are given more autonomy so that they can be flexible and responsive to the needs of their students. Principals are encouraged to think of themselves as the CEO of their schools. They are to lead their staff, manage the school systems and produce the desired educational outcomes. To support this change, the way that schools are being appraised has been changed since 2000. The school today is asked to do self-appraisal using the new School Excellence Model (SEM): (p. 27)

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2 The SEM is a self-assessment model for schools based on various quality models used by business organizations. It aims to provide an objective manner to identify and measure a school’s strengths and areas for improvement and benchmarking against similar schools, stimulating improvement activities that can positively impact the overall quality of the school and ultimately the quality of the education system. Linked to the SEM is the Masterplan of Awards (MoA) for schools. There are 3 levels of awards. The first level comprises the Achievement Awards given to schools each year for current year’s achievements. The second level comprises the Best Practices Award (BPA), and the Sustained Achievement Award (SAA). At the apex of the awards is the School Excellence Award (SEA), which gives recognition to schools for excellence in education processes and outcomes. Schools may also apply for the Singapore Quality Award (SQA) just like any other industrial or commercial sector organizations (Ng, 2003).
Moreover, under the TSLN vision, schools are seen as 'sites of learning' where innovation and creativity are encouraged and where the curriculum has grown to be more flexible and diverse to cater for different talents and abilities. Teachers are no longer expected to be dispensers of knowledge, but facilitators of students' learning and the development of their thinking skills and dispositions.

With TSLN's critical thinking thrust, there is also a need for critical thinking to be an explicit educational objective and therefore an explicit aim of teaching and learning in the schools and classrooms. While some teachers may typically argue that thinking has been one of the implicit objectives in their teaching all along (Lipman, 2003), explicit educational mandates on the integration of critical or higher-order thinking in teaching clearly illustrate that the thinking objective can no longer be an implicit, but an explicitly articulated teaching and learning aim.

Furthermore, Singapore's educational developments over the decades illustrate a clear departure from a traditionalist paradigm to a progressive one, notably in the shape of TSLN's emphasis on critical thinking and the focus on the learner. Where once didactic methods and teacher-centred pedagogies seemed sufficient, TSLN's critical thinking aim requires schools and teachers to recalibrate, confront and unlearn obsolete pedagogical mental models.

Collectively, the TSLN critical thinking thrust entails significant changes and challenges for teachers. In terms of their knowledge and practice, TSLN calls for teachers to confront and unlearn traditional didactic pedagogical approaches for the learning and practice of new constructivist pedagogies that are consistent with TSLN's aim of developing 'thinking learners'. These new demands on teachers seem to have been recognised by Singapore's only teacher education body, the National Institute of Education (NIE), at around the time of TSLN's implementation in 1998:

... the teacher will be required to respond effectively to pupils' inquiries and to lead them to higher levels of conceptual understanding. This demands a set of new dimensions facing
teacher training ... It calls for a shift from knowledge transmission to process-oriented learning and education and a stress on collaborative and inter-disciplinary learning. Included in the new emphasis are discovery and exploratory learning, use of technology and IT and reform of assessment procedures. (Seng, 1998, p. 3)

In line with this recognition and as part of the TSLN policy, NIE in conjunction with the MOE set out the following initiatives:

The teaching of thinking skills in pre-service programmes. This included a review of course modules to integrate thinking skills, an emphasis on a process-oriented approach of instruction and a revision of practicum assessment that required teachers to demonstrate their ability to develop students' thinking.

- In-service training for teachers. This included training teachers for the ‘Thinking Programme’ in which generic topics on thinking and learning, such as integrating thinking in content areas and assessment and Marzano's (1988) Dimensions of Learning, were covered. Other forms of training (beginning with junior college or pre-university teachers) involved a series of workshops in which the objectives were to: develop learning attitudes which foster thinking dimensions; identify and use general, critical and creative thinking skills; infuse thinking skills into content areas; and evaluate simple and complex thinking skills.

- Establishment of the Singapore Centre for Teaching Thinking (SCTT). This initiative is viewed as a demonstration of NIE's commitment to the TSLN thinking objective. SCTT's aims included the creation of programmes and carrying out research that improved the development of students' thinking and the infusion of thinking in the school curriculum. (Seng, 1998)

These initiatives were described as 'a global comprehensive approach by the NIE and the Ministry of Education in Singapore ... taken to emphasize the importance of infusing thinking into the education system' (Seng, 1998, p. 7).
In sum, they can be viewed as efforts in the support and development of teachers' knowledge base and teaching of thinking.

However, although acquiring such knowledge is undoubtedly essential for teaching thinking, the development of teachers who can create 'thoughtful classrooms' (Beyer, 1997; Onosko & Newmann, 1994; Ritchhart, 2002) — which are essential to TSLN's aim of developing 'thinking learners' — requires more than this. Effectively implementing thinking requires not only restructuring, but also 'reculturing' (Boyd, 2000; Fink & Stoll, 2005; Fullan, 2000). This involves teachers confronting old pedagogical beliefs during teacher education and development, and reconstituting them with beliefs that are conducive to the development of thinking.

In addition, the initiatives aimed at training teachers seem to be informed by traditional assumptions of teaching as a mere technical enterprise (Bascia & Hargreaves, 2000). They are also guided by the notion that implementing thinking is merely about translating newly acquired sets of skills from in-service and pre-service education into teaching practices. By and large, teacher education informed only by the conception of teaching as a technical enterprise fails to attend explicitly to the intellectual aspect of teaching and teachers (Dewey, 1977; Giroux, 1985, 1988, 2004).

The development of teacher knowledge and beliefs to implement critical thinking also needs to be long term and on-going (Paul, 1995). Teachers must recognize that thinking instruction means more than just designing tasks that encompass Bloom's hierarchy of cognitive thinking processes (Bloom, 1956; Anderson et al. 2001) such as 'synthesize' and 'evaluate' (Paul, 1995), or incorporating such tasks as part of thinking-infused lessons. Importantly, it is about developing both students' thinking skills and thinking dispositions as part of the classroom cultural forces (Ritchhart, 2002) which are consistent with the aim of developing thinking learners.

The task of teaching thinking effectively requires teachers who themselves possess such abilities and dispositions (Duffy, 1994; Paul, 1995; Ritchhart, 2002). For this to be achieved, teacher training providers need to recognize
that in the context of developing students’ thinking, especially, teaching must be seen as an intellectual enterprise (Dewey, 1977; Bascia & Hargreaves, 2000) and teachers as intellectuals (Giroux, 1985, 1988, 2004). That is, in their education and practices, teachers need to constantly engage themselves and others both ‘dialectically’ and ‘dialogically’ (Paul, 1995). Dialectical in the sense that teachers, for instance, assess reasons and assumptions grounding their pedagogical knowledge and beliefs, and dialogical in the sense that they critically engage their viewpoints and perspectives in dialogue with others. In short, teaching in the context of TSLN’s aspirations must be seen more than just ‘doing’, it also requires ‘thinking’.

Teachers who aspire to develop critical thinking under the TSLN policy also need schools that create environments that are conducive to the development of thinking (Costa, 2001; Golding, 2006a, 2006b; Ritchhart, 2002), or function as ‘sites for learning’ (Goh, 1997). Fulfiling the thinking aim must go beyond just fulfilling the mandated quota of ‘thinking-infused’ lessons. It requires a whole-school approach that manifests in environments and policies that explicitly value, promote and reward thinking. For thinking to be constituted as part of Singaporean schooling and education, it must play an explicit role in student assessments and be a key performance indicator in school performance evaluations, such as those contained in the School Excellence Model (SEM). In other words, school leaders have to realign their school policies, mission and vision statements to provide teachers with conducive contexts that help fulfil the aims of TSLN. And, importantly, they must accord a corresponding explicit recognition of teaching as an intellectual enterprise and teachers as intellectuals.

**Summary**

Part I of this chapter presented:

- a broad understanding of contemporary Singapore;
- Singapore’s educational contexts and developments, and its underlying philosophies and tenets;
• a timeline of key events and policies affecting the Singaporean educational landscape; and

• a discussion of the TSLN policy and its various implications for schools and teachers.

Part II of the chapter that follows is devoted to a discussion of critical thinking, which is a key aspect of TSLN and pertinent to the study.
PART II

CRITICAL THINKING

Introduction

Part II of the chapter addresses the study's focus on critical thinking. Questions such as 'What is the role of thinking in today's educational context?', 'What does critical thinking mean?', 'What does its teaching entail?' and 'What are the constraints of thinking instruction?', which are germane to the study guide the review. Here, I also argue for an expansive view of critical thinking as a means to grapple with its intrinsic multifaceted notion. In connecting with the Singaporean educational context, I conclude by discussing Singapore's initiatives in relation to thinking instruction in its educational system.

Critical thinking, education and a rapidly changing world

The call for the teaching of critical thinking as an essential part of education is not new. Dewey (1938), for instance, argued for its importance in schooling and education in the early part of the 20th century. Now, critical thinking is being recognised again as one of the central tenets of education in the preparation of future citizens for the changing global economic landscape.

The explicit recognition of critical thinking as a vital part of education is illustrated by the recalibration of educational goals by policy makers and education stakeholders in which the incorporation of thinking is an essential part of the educational reform agenda. Singapore's Thinking Schools vision is unequivocal testimony to this. Other educational systems in North America, the UK (Bailin, Case, Coombs et. al, 1999) and in Asia Pacific countries, such as Malaysia (Nagappan, 1998, 2001) and Australia (Dixon, Moss, Ferguson et al., 2006), have also embarked on similar reforms. These systems have constituted thinking as a key component of their educational objectives and have featured it strongly in curriculum documents and as a focus for teacher professional learning.
The ability to think critically is a key skill for survival in an ever-changing world and the foundation of the contemporary education system (Berliner, 2009; Lipman, 2003; Paul, 1995; Scheffler, 1989). Developing the ability to think critically is indeed an imperative in a rapidly changing world which demands more of individuals in their personal, social and professional domains. The unprecedented impact of globalization requires the intellectual ability to manage competently one's personal and social spaces which are continually being redefined by the forces of globalization. This ability is arguably a necessity for the citizens of the 21st century (Halpern, 2003) to survive and thrive. In addition, Hunt (1995) poses the question, 'Will we be smart enough?' in his examination of the skills which will be needed by the workforce of tomorrow and he argues that individuals' quality of life and even the future state of the planet are dependent on how this question is addressed.

Thus, the paradigm shift in the focus of education to the development of thinking can be attributed to the need to ensure that the citizens of tomorrow are well-equipped to survive in an increasingly complex world. Without the ability to think critically, individuals would be greatly challenged in the face of a host of complex tasks and roles. Moreover, if today's education systems shoulder the responsibility of producing the work force and global citizens of tomorrow, then arguably, the ability to think critically is central to schooling and the curriculum.

In addition, the advent of the Information Age and the growing influence of the Internet is another reason why educational systems, which harbour any hope for preparing future citizens for a relentlessly globalizing planet, should incorporate critical thinking in their curriculum. The importance of being able to think critically in this context is also stressed by Singapore's current Minister of Education, thus, underlining the currency critical thinking still holds in the educational system 10 years after TSLN was launched:

With the Internet Revolution ... [t]he premium is ... no longer on collecting facts but on critical analysis — knowing what questions to ask, what information you need and the value of different sources of
information ... Students cannot be just mere passive conduits of information. They will need to be able to connect between different interfaces and domains. (Ng, 2008; emphasis added)

Educationists (e.g. Dewey, 1938; Costa, 2001; Lipman, 2003; Paul, 1995; Winch, 2006) have pointed out the importance of critical minded citizens in democratic societies. They contend that good citizenry requires that citizens possess the intellectual autonomy to formulate individual opinions and to make their own educated decisions and choices. It is this intellectual independence founded on critical mindedness and not passive acquiescence that will be a pillar of thriving democracies.

Defining critical thinking: competing conceptions

While critical thinking is placed as one of the core foundations of a reformed educational system accompanied by the push for learner-centred pedagogies in addressing the global challenge, there is still, however, no universal consensus on a definition of critical thinking amongst educators, philosophers and psychologists in the field. Although there was an attempt to reach a consensus in the shape of a 'Delphi Report' which saw a panel of 46 experts in various fields issue a broad statement on critical thinking (Facione, 1990), a survey of current literature on critical thinking shows that this has not ceased the debate. On the contrary, the review of the literature gives credence to the view that the term has as many definitions as there are experts in the field (Benderson, 1990).

In numerous instances, the review of literature on critical thinking suggests that the notions of 'critical thinking' and 'higher-order thinking' are seen as equivalents (e.g. Anderson, et al., 2001; Bloom, 1956; Paul, 1995) — a view that I also take in this study. And while 'thinking' per se is undoubtedly not the equivalent of or synonymous with critical or higher-order thinking, these terms and notions are often abbreviated to 'thinking' in relevant literature when used to refer to the type of thinking associated with critical or higher-order thinking (e.g. Beyer, 1997; Brandt; 2001; Costa, 2001; Ennis; 1993; Noddings, 2008; McPeck, 1991; Presseisen, 2001; Ritchhart, 2002; Paul, 1995; Zohar, 2004). Consistent with this practice, unless specified otherwise, my usage of the
The term 'thinking' in this study refers to critical thinking — abbreviated. The expansive and multidimensional notion of critical thinking is now discussed in greater detail in the continuing section.

Historically, the basic notion of critical thinking can be traced back 2400 years to the time of Socrates (Paul, 1995) in his *elenchus*, or Socratic Dialogue. It is only in the 1980s that critical thinking began to emerge prominently in the debates among educators regarding the future direction of education (Facione, Facione & Giancarlo, 2000).

This lack of unity in defining critical thinking can be attributed to the differing perspectives from which disciplines such as philosophy and psychology view critical thinking. According to Benderson (1990) and Lewis and Smith (1993), these perspectives are intrinsically different. Philosophers have tended to emphasize the nature and quality of the products of critical thinking, for example, the analysis of arguments. However, psychologists focus on the notion of 'thinking skills' and have concentrated on the process of cognition, the components and operations used to address academic and practical issues (Reed, 1998). Moreover, cognitive and developmental psychology have an empirical research base, while philosophy has relied on theorizing and logical reasoning to reach conclusions. As such, their respective elucidation of the definitions and goals of critical thinking differ (Fasko, 2003).

**Philosophical conceptions of critical thinking**

Dewey (1938) perceived critical thinking as reflective thinking. This is seen as the:

> active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends ... [it] includes conscious and voluntary effort to establish belief upon firm basis of evidence and rationality. (p. 9)

Among other philosophical-based theories, Ennis (1985) views critical thinking as 'reasonable reflective thinking that is focused on deciding what to believe and do' (p. 45). Ennis elaborated the attributes of critical thinking into
12 dispositions and 12 abilities. He prescribed 'a taxonomy of critical dispositions and abilities' in which he not only delineated the skills that critical thinking involves, but also outlined dispositions that the critical thinker ought to possess (Ennis, 1985, 1993). In this study, 'dispositions' is defined as the 'characteristics that animate, motivate, and direct our abilities toward good and productive thinking and are recognised in the patterns of our frequently exhibited, voluntary behaviour' (Ritchhart, 2002, p. 21).

The importance of disposition in critical thinking notions is also highlighted by Paul (1995), Ritchhart (2001, 2002), Tishman, Jay and Perkins (1995), Costa (2001) and Marzano (1988, 1992). For instance, Ritchhart's idea of 'intellectual character' consists of six dispositions identified by differing theorists in the field such as Ennis (1985, 1993) and Paul (1995). Within this framework, critical thinking comprises the dispositions to seek 'truth and understanding', to be 'strategic' and to be 'skeptical' (Ritchhart, 2002, p. 27). Similarly, Costa's (2001c) Habits of Mind [HoM] delineate key traits that can be viewed to comprise what I refer to as the dispositional, attitudinal or 'characterological' (Ritchhart, 2002, p. 19) dimension of critical thinking. The HoM draw attention to the habits that are key to intelligent behaviour and thinking.

However, it must be acknowledged that some theorists draw a distinction between critical and creative thinking and their respective dispositions. In contrast to Ennis (1987) and Facione (2000), Ritchhart (2001, 2002) in his concept of intellectual character, for instance, describes being 'open-minded' and 'curious' as creative thinking dispositions. He also breaks down Paul's (1995) critical thinking dispositions, or 'intellectual traits', into creative thinking ('looking out'), reflective thinking ('looking in') and critical thinking ('looking at'). Thus, while further distinctions such as these are made, they nonetheless illustrate the intrinsic and significant conceptual overlaps.

Apart from conceptions of critical thinking as comprising cognitive skills and processes — what I describe as the cognitive dimension — the attitudinal, dispositional or 'characterological' dimension of critical thinking highlights the importance of thinking dispositions and attitudes that predispose a person to
think critically in daily situations. Thus, while having the ability to think critically is essential, having the natural inclination to do so in various situations is also key (Ennis, 1991; Facione, 2000; Ritchhart, 2002; Paul, 1995; Tishman, Jay & Perkins, 1995).

In offering another definition, Facione (1984) views critical thinking as 'the development and evaluation of arguments' (p. 259). Lipman (2003) contends that it is 'thinking that facilitates good judgment because it relies upon criteria; is self-correcting; and is sensitive to context' (p. 213). Siegel (1991) points out that the critical thinker must also have 'a critical spirit' (p. 18), which can be viewed as the propensity and inclination to think critically that refers to the characterological dimension of critical thinking as discussed.

Splitter (1991) furthered this conception of critical thinking by contending that for critical thinking to occur, there needs to be 'a community of inquiry' (p. 100) — a concept first coined by Lipman (1985, 2003) that views thinking as a social, collective and collaborative practice. Another philosophical view of critical thinking is one that has been posited by Paul (1995). Similarly, he perceived such thinking as 'dialectical and dialogical' in which critical thinkers must move beyond the atomistic analysis to comprehend the issue at hand and the 'world view' of their 'opponents' (Costa, 2003), or others.

However, Paul (1995) resists pigeon-holing critical thinking and conceptualises it in a number of different ways that should not be viewed as mutually exclusive. His definitions include: 'thinking about your thinking while you're thinking to make your thinking better' (p. 91), which has a metacognitive dimension; and the following definition which seems to be characterised by the characterological dimension of thinking:

a unique kind of purposeful thinking in which the thinker systematically and habitually imposes criteria and intellectual standards upon the thinking, taking charge of the construction of thinking, guiding the construction of the thinking according to the standards, assessing the effectiveness of the thinking according to the purpose, the criteria, and the standards. (p. 21)
For Paul, (1995) critical thinking as a cognitive process alone is insufficient. Both the propensity to think critically and the attachment of standards he refers to as ‘intellectual standards’ — the criteria by which to assess the quality of thinking — are also essential. These criteria include clarity, precision, relevance and logical coherence in the act of thinking critically. Paul also underlines their importance by warning against superficiality and the impropriety of certain manifestations of critical thinking, labelling them as ‘pseudo critical thinking’ (p. 47).

McPeck’s (1981) conception of critical thinking differs from that of Ennis (1985) and Paul (1995). He argues that thinking cannot be a generalized skill because thinking critically cannot be done in isolation, asserting that the essence of the meaning of critical thinking is ‘a propensity and skill to engage in an activity with reflective scepticism’ (p. 8). McPeck claims that it is conceptually impossible to view thinking as a generalizable skill as thinking must done about something and is determined by the problem in question.

This ‘specificist’ view is also echoed by Brookfield (2003) who argues that critical thinking is ‘irrevocably context bound as it can only be understood, and its development gauged, within a specific context’ (p. 157). Thus, thinking critically has to be always about something and not done in a vacuum.

Differences aside, what is clear among the philosophical conceptions of critical thinking discussed is their tendency to focus on the importance of argument analysis that stems from the emphasis of informal logic. The primary concerns lies with the analysis of arguments on grounds of their validity and soundness, and the key role of the characterological dimension of thinking dispositions as more recent theories suggest (e.g. Costa; 2001a, 2001b; Paul 1995; Ritchhart, 2001, 2002; Tishman et al., 1995).

**Psychological conceptions of critical thinking**

Psychological conceptions of critical thinking are grounded in the cognitive dimension of critical thinking. Bartlett (1985) defines critical thinking as ‘the extension of evidence in accord with that evidence so as to fill up gaps in the
evidence' (p. 75). By contrast, Sigel (1984) views it as 'an active process involving a number of denotable mental operations such as induction, deduction, reasoning, sequencing, classification and definition of relationships' (p. 18).

Other definitions from a psychological perspective include the views that critical thinking is:

- 'an active and systematic attempt to understand and evaluate arguments' (Mayer & Goodchild, 1990, p. 4);
- 'a sequence of internal symbolic activities that leads to novel, productive ideas or conclusions' (Ericson & Hastie, 1994, p. 38); and
- 'an attitude of asking why' (McBurney, 1996, p. 2). This dispositional perspective seems to parallel the view of critical thinking as espoused by others such as Tishman et al. (1995) and Ritchhart (2001, 2002) in which it is seen as having a characterological dimension — one which is associated with the character and attitude of a person (Ritchhart, 2002).

Bloom's Taxonomy of Educational Objectives (Bloom, 1956) also offers a perspective of critical thinking. His seminal cognitive domain is a hierarchical and cumulative taxonomy of six cognitive categories — knowledge, comprehension, application, analysis, synthesis and evaluation — that comprises lower-order to higher-order thinking skills. The mastery of the higher-order skills, which require more complex thinking than the lower-order skills, presumes the prior mastery of the lower-order skills. It is the higher-order skills such as analysis, synthesis and evaluation that are associated with critical thinking (Anderson et al. 2001; Krathwohl, 2002; Paul, 1995)

However, the revision of the original taxonomy by Anderson et al. (2001) saw a number of changes. Among these is the separation of cognitive processes from the knowledge dimension, both revised as having their own dimension. The revised cognitive processes are: remembering, understanding, applying, analysing, synthesising, evaluating and creating (Anderson, et al. 2001). Apart from the change of the cognitive processes from the noun to the verb
form (e.g. 'analysis' to 'analysing'), there were also the reordering and renaming of three cognitive processes. 'Knowledge', 'comprehension' and 'synthesise' were renamed 'remembering', 'understanding' and 'creating' respectively.

Furthermore, unlike Bloom's original conception, the various cognitive processes are not perceived to assume a strict hierarchical and cumulative structure. The revised ordering of the cognitive processes was to reflect the complexity of each cognitive process rather than their hierarchical and cumulative order as in the original (Krathwohl, 2002). Also in the revised version, 'evaluating' and 'creating', previously known as 'synthesise', swapped places — the former was moved off the top to be replaced by 'creating', highlighting it as the cognitive process which involved the greatest cognitive complexity. As with the original taxonomy, Anderson et al. (2001) suggest that critical thinking comprises the cognitive processes of analysing, evaluating and creating. Thus, it is these highly complex cognitive processes that are tantamount to critical thinking in the manner which Paul (1995) also suggests.

**Implications of differing conceptions in education**

While most educators agree that critical thinking needs to be part of education, this consensus dissipates when the notions of critical thinking are articulated and enacted in the curriculum (Bailin et al., 1999b). This departure could be attributed to the differing influences of the philosophical and psychological conceptions of critical thinking and the primary issue of which types of thinking skills are deemed essential (Beyer, 2001a).

Bailin et al. (1999b) argue that most conceptions of critical thinking in education mistakenly view it as merely comprising skills, processes and procedures. While these conceptions are helpful in understanding critical thinking, they often result in educators overlooking the important notions of quality and standards of thinking in its instruction — notions that echo Paul's (1995) emphasis on the importance of 'intellectual standards', which he defines as 'principles by which reasoning can be judged' (p. 536) to assess the quality of thinking. Bailin et al. contend that when teaching thinking is
perceived as merely the teaching of skills, processes and procedures, the
element of contextual knowledge is effectively ignored as a key dimension of
good critical thinking.

Like Tishman et al.'s (1997) and Ritchhart's (2002) emphasis on the
dispositional dimension of critical thinking discussed previously, Bailin et al.
(1999b) propose a conception of critical thinking that takes into account the
characterological and behavioural dimensions of thinking that go beyond the
notion of critical thinking as a mere grab bag of cognitive skills or procedures.
Like Paul (1995), Bailin et al. argue that the focus in the teaching of critical
thinking should be on developing an awareness of the quality of the thinking
itself.

Although skills and procedures are a part of critical thinking instruction, Bailin
et al. (1999b) maintain that the development of bodies of knowledge within
relevant contexts is also crucial. Together with attitudes and dispositions in
developing the natural tendency to apply critical thinking abilities, the
development of the bodies of knowledge within relevant contexts form the
essential dimensions in teaching critical thinking. Bailin et al. believe it is the
incorporation of these dimensions that will lead to a more effective enactment
of the critical thinking objective in the curriculum.

While conceptions of critical thinking from the education standpoint are
generally grounded on philosophical or psychological perspectives, they also
seem to possess a more pragmatic slant. Kurfiss (1988), for example, states
that critical thinking is:

an investigation whose purpose is to explore a situation, phenomenon, question, or problem to arrive at a hypothesis or conclusion about it that integrates all available information and that can therefore be convincingly justified. (p. 2)

Similarly, Steel (cited in Fasko, 2003) views critical thinking in the context of
higher education as skills 'to solve problems for which they have no ready-
made procedures or solutions' (p. 8) in which the pragmatic purpose of critical
thinking is made apparent.
In the absence of a consensus on the definition of critical thinking among writers, a number of theories that synthesize the salience of each conception have been advanced. Halonen (1995), for instance, suggests that critical thinking is the ‘propensity and skills to engage in activity with reflective skepticism focused on deciding what to believe or do’ (p. 76). Fasko (2003), who points out that such a conception excludes several concepts from the psychological and educational perspectives, extends this conception by suggesting that critical thinking is the ‘propensity and skills to engage in mental activity with reflective skepticism focused on deciding what to believe or do that can be justified’ (p. 8).

Conversely, Lewis and Smith (1993), attempt an all encompassing definition of higher-order thinking which they conceive as the kind of thinking that ‘occurs when a person takes new information and information stored in memory and interrelates and/or rearranges and extends this information to achieve a purpose or find possible answers in perplexing situations’ (p. 136). This is not dissimilar to the higher-order thinking skills ‘analysis’, ‘evaluation’ and ‘synthesis’ found in Bloom’s (1956) original taxonomy or the cognitive processes ‘analysing’, ‘creating’ and ‘evaluating’ in the revised version (Anderson et al., 2001).

Lewis and Smith (1993) also point out that ‘problem-solving strategies derived from psychology and the disciplined thinking represented by philosophical thought both contribute to achieving the goal of learning to reason’ (p. 136). Having stated this, they nonetheless believe that neither perspective on its own is sufficient in understanding the conceptualization of higher-order thinking. At this point, it is important to draw the unequivocal connection between higher-order thinking and critical thinking. Paul (1995) asserts that critical thinking in its ‘deepest and fullest meaning’ (p. 283) is equivalent to higher-order thinking, while Anderson et al. (2001) concur that Bloom’s higher-order cognitive processes comprise critical thinking. Thus, given these inseparable links, critical thinking is viewed as being equivalent to higher-order thinking in this study.
Critical thinking conceptions: common platforms

While the various theories of critical thinking discussed certainly differ with regard to some key points, they also reveal some common emphases. Johnson (1994) identifies the following similarities among the theories:

- a reflective sceptical or questioning attitude;
- a sensitivity to value or ideology-laden assumptions;
- an insistence on appropriate supporting grounds before accepting disputable claims;
- an appreciation of the various criteria applicable to good reasoning and argument (whether general or subject dependent);
- skill and judgment in the analysis and evaluation of claims and arguments; and
- a disposition to be self-reflective, sensitive to one's own possible biases or assumptions. (p. 46)

Johnson's (1994) examination reveals not only an emphasis in philosophical perspectives of critical thinking on intellectual theories and skills taught by informal logic, but also notes philosophers' concern for the propensities to exercise those skills (Reed, 1998). Ritchhart (2002) also echoes this when he lists the dispositions that are essential in critical thinking: seeking truth and understanding, being sceptical and being strategic. In addition, there seems to be some overlaps in the various theories: the act of critical thinking involves specific processes and/or skills and the propensity to think critically is crucial.

Moreover, conceptions of critical thinking as postulated by theorists such as Paul (1995) suggest that critical thinking is not only associated with criticality per se. As discussed earlier, his various conceptions of critical thinking evidently also involve both elements of creative and metacognitive thinking. In proposing the notion of critical thinking as being essentially dialogic, Wegerif (2007) also makes a similar point. This is demonstrated in his reconceptualisation of Lipman's (2003) critical, creative and caring thinking
taxonomy into one of dialogue comprising critical, creative and caring dialogue.

**Critical thinking conceptions: a case for a unifying ‘family resemblance’**

I suggest that one way to understand the differing conceptions of critical thinking simultaneously and to find commonality among them is to employ Wittgenstein’s (1958) notion of ‘family resemblance’ (p. 67) — a significant idea in the philosophy of language that Wittgenstein first coined in his book, *Philosophical Investigations*. His idea, I propose, does two things. One, it provides a way that the multifaceted nature of critical thinking can be understood; this will also be important in the understanding of teachers’ and students’ perceptions and practice of critical thinking. Two, it can offer a means of mediation in the conceptual tension arising from competing definitions. While this does not imply that ‘any given conception of critical thinking is the correct one and all conceptions of critical thinking are equally good or defensible’ (Bailin et al., 1999b, p. 286), it nevertheless provides a common platform to begin grappling with the fundamental similarity that is inherent among the various conceptions of critical thinking — the ‘family resemblance’ (Wittgenstein, 1958) that exists in the various conceptions.

In the development of the notion of ‘family resemblance’, Wittgenstein (1958) argues that certain terms such as ‘games’, ‘numbers’ and ‘family’ do not allow a sufficiently complete definition. However, this certainly has not stopped these terms being used as meaningful references and applications. In the case of the idea of ‘games’, Wittgenstein contended that there is nothing that is common to all conceptions of the term ‘games’. These definitions of games hold certain similarities and relations with each other as some things that are considered ‘games’ evidently involve winning and losing, but not all; some are entertaining, but not all; some require luck, but not all, and so forth.

The same applies with the notion of ‘numbers’. There is nothing that can be said that all numbers have in common. However, this has not stopped its meaningful usage as the notion is extended to include prime numbers, integers and cardinal numbers; the only limit it would seem in this case lies in
the capacity of mathematicians to innovate the limit. It is with a similar example of the term ‘family’ that Wittgenstein (1958) abstracts a notion of similarities and relations:

I can think of no better expressions to characterize these similarities than ‘family resemblance’; for the various resemblances between members of a family: build, features, colour of eyes, gait, temperament, etc. overlap and criss cross in the same way. (p. 67)

I propose that the definitions of critical thinking found in the literature can be thought of similarly in this way. Although the notion of ‘family resemblance’ might be taken to have ‘blurred edges’, Wittgenstein (1958) points out that terms such as ‘game’ and ‘numbers’ nevertheless are sensible; the lack of precision has not rendered such terms meaningless. Furthermore, a clear demarcation can be drawn to suit whatever purpose is present. Consistent with Wittgenstein’s stance, the fact that a precise definition to something cannot be given, in this case critical thinking, should not obscure the knowledge of what that something is, or prevent its meaningful usage. As Wittgenstein (1958) says, ‘... this is not ignorance. We do not know the boundaries because none have been drawn’ (p. 69).

Therefore, I suggest that with the notion of critical thinking, too, there is a kind of family resemblance inherent in its definitions which are indeed generalizable at the level of context and purpose. Thus, I argue that the definition of critical thinking is dependent on its context and purpose and is largely determined by them. However, this does not imply that one conception of critical thinking is a diametrically distinct concept from the other. Rather, there are relations and similarities among these definitions that ‘overlap and criss cross’ (Wittgenstein, 1958, p. 67).

Like Paul (1995), I believe that critical thinking should not be restricted to a particular conception which is exclusive, given that the various definitions of it discussed earlier suggest that it has both characterological and cognitive dimensions. Thus, building on consensus with regard to the essence of critical thinking that is emergent in the various fields and theories, I argue that critical thinking, like democracy, has myriad manifestations which are largely
informed by its context and purpose. For instance, if the immediate context is the analysis of a newspaper editorial and the specific purpose is argument analysis, then it is not unreasonable to see critical thinking in this case as 'the development and evaluation of arguments' (Facione, 1984, p. 259). However, if the immediate context is researching into a real life problem and the goal is to find a workable solution, then there is no contradiction in defining critical thinking in this instance as having 'to solve problems for which they have no ready-made procedures or solutions' (Steele, cited in Fasko, 2003, p. 8) or 'reasonable reflective thinking that is focused on deciding what to believe and do' (Ennis, 1985, p. 45).

However, these instances of critical thinking would not have been adequately defined had the context and purpose not been considered. Defining the first instance of critical thinking, for example, as a means 'to solve problems for which they have no ready-made procedures or solutions' and the second instance as 'the development and evaluation of arguments' (Facione, 1984, p.259) would not have been entirely appropriate as these instances would not have regarded the context and purpose of the intended activity. The same can be argued for Bailin et al.'s (1999b) and Tishman et al.'s (1995) conceptualisations of critical thinking that seem to take into account the larger context of educational goals.

As argued, the assertion that goal and context are key in defining critical thinking does mean that all these definitions diametrically contradict one another. On the contrary, I suggest that the various conceptions of critical thinking share a 'family resemblance' in the way that Wittgenstein suggests the concept of 'games' and 'numbers' do. Therefore, I am of the view that critical thinking should not be and cannot be tied down to an exclusive conception that precludes all else. Just as the usage of terms such as 'numbers' and 'games' has not stopped their meaningful usage, I suggest the same in the case of education with critical thinking — it can be employed meaningfully and constructively in spite of the absence of a singular and unequivocal definition.
Thinking in the curriculum: looking at purpose and context

The main contention proffered is that it is counterproductive to conceive a definition of critical thinking without having first considered its context and purpose. Consider the cases where critical thinking has come to be a pillar in the education curriculum, for example, Singapore's TSLN and Victoria's (Australia) Victorian Essential Learning Standards (VELS) (Department of Education & Training, 2006). The incorporation of thinking in the curriculum shows that the debates about definitions and their consequent concerns have not stopped critical thinking, or the variations and dimensions of it, from being instituted as an educational objective. Each of these education systems has outlined the input it intends from the thinking initiative. Singapore's Ministry of Education delineates its thinking objective in its aim to enable students to acquire and understand core thinking skills and processes, apply skills in learning, decision-making and problem-solving situations and develop habits to become critical, creative and self-regulated thinking learners (Curriculum Planning and Development Division, Ministry of Education of Singapore, 1998).

By contrast, VELS situates thinking as one of the three domains that comprises 'reasoning, processing and inquiry; creativity and reflection; evaluation and metacognition' (Dixon, et al., 2006, p. 59).

Therefore, in light of the various conceptions of critical thinking espoused in the literature, it can be argued that notions such as decision-making, problem-solving, reasoning, evaluation and metacognition entail processes that significantly overlap. For instance, analysis, evaluation and reasoning clearly are the key cognitive processes in philosophical conceptions of critical thinking. Problem solving and decision-making are processes that are not only connected with and overlap each other, but involve the use of the different critical thinking skills such as analysis and evaluation, which are also suggested by Paul (1995), Marzano et al. (1988) and Anderson et al. (2001).

It is evident that the delineated sets of aims connected to thinking in the Singaporean and Victorian curriculum are influenced by the different
conceptions of critical thinking and determined by the respective curriculum's context and purpose. While the aims and conceptions of critical thinking overlap, they are clearly not identical. I argue that the meaning and conceptualization of critical thinking are determined by the very context and purpose of the thinking which in the respective curricula are stated as educational objectives. Thus, this illustrates that critical thinking or its variants can be meaningfully conceived, understood and practised in spite of the lack of an unequivocal definition agreed upon by all philosophers, psychologists and educators in the field. I suggest that this demonstrates that while the conceptions differ, it is the family resemblance within these definitions that make their references and practice still meaningful and constructive.

Moreover, Halpern (2003) argues that ambiguity and definitional disagreements surrounding other constructs such as 'political conservative', 'economic indicators', 'general education' or 'liberal arts', have not prevented them from being used meaningfully in specific contexts. For example, the lack of a clear definition of what 'liberal arts' entails has not prevented educational institutions from having a liberal arts faculty. Similarly, critical thinking cannot be restrained by particular conceptions because its applications are far-ranging. To define critical thinking stringently is to weaken its capacity and applicability in education, especially.

The expansive perspective of critical thinking offered here is consistent with the view that it is a 'polymorphous or multi-form enterprise' (Bailin et al., 1999a, p. 279). Importantly too, the purpose of my study necessitates the pursuit of such an expansive conception of critical thinking, rather than a reductionist one. First, it allows for a wider platform in which to examine the ways teachers and students perceive critical thinking. And second, it facilitates the articulations of participants' different understandings and practices across the dimensions of critical thinking, allowing the possible variations in dimension and depth of understandings and enactment to be better understood.
Teaching critical thinking: approaches and debates

Although there is general consensus among theorists and educationists in the view that critical thinking is an important aspect of education, disagreement, exists when it comes to the issue of the most effective approach in teaching critical thinking. In part, this is due to the theoretical differences in the manner in which critical thinking is understood — either as a generalizable skill(s) that can be applicable across diverse domains or as a domain specific activity in which thinking is focused on a particular subject or content.

Costa (2001b) and Brandt (2001) divide the approach to teaching thinking into three main categories. These are:

1. teaching of thinking;
2. teaching for thinking; and
3. teaching about thinking. (emphasis added)

Brandt (2001) describes the teaching of thinking as primarily the teaching of explicit thinking skills ‘using teaching methods and special materials not usually found in the typical school curriculum’ (p. xii-xiii). Similarly, Costa (2001b) suggests that this also requires that ‘teachers instruct students directly in the processes of thinking’ (p. 355). However, his conception of this category includes the teaching of thinking dispositions that are also taught directly together with the cognitive skills and operations. This view of thinking instruction is consistent with others like Tishman et al. (1995) and Ritchhart (2002).

Teaching for thinking according to Costa (2001b) ‘simply means that teachers and administrators examine, monitor, and strive to create school and classroom conditions that are conducive to children’s thinking’ (p. 354). This, for instance, includes classroom activities that ‘challenge and engage students’ minds’ and the creation of a larger school climate that models, encourages and supports thinking. The notion of the conducive classroom climate for thinking here is equivalent to Ritchhart’s (2002) and Beyer’s (1997) notion of ‘thoughtful classrooms’.

51
Brandt (2001) describes teaching about thinking as essentially developing students’ metacognition — or to be able to ‘think about their own thinking — to become conscious of their own thought processes and improve their ability to control them to some degree’ (p. xiii). However, Costa (2001b) broadens this category by further subdividing it into four components. These are:

- brain functioning
- metacognition
- great thinkers
- epistemic cognition (Costa, 2001b, p. 355).

The first component, brain functioning, primarily refers to the raising of fundamental questions about the cognitive aspect such as ‘How do we think?’ and ‘How do we learn?’ The second, metacognition, which denotes ‘[b]eing conscious of our own thinking and problem-solving during the acts of thinking and problem-solving’ (p. 356), can be manifested in classroom activities such as having student discussions about their thinking and learning how to learn.

The third component, great thinkers, like the name suggests, is essentially about exposing students to figures who are famed for their seminal intellectual achievements such as Albert Einstein and Leonardo Da Vinci. Related to this is the final component, epistemic cognition. This component focuses on the deeper examination of the ‘methods’ of great thinkers by learning their various processes of ‘inquiry, and creativity that underlie their productivity’ (Costa, 2001b, p. 356).

Although Costa (2001b) suggests that such kinds of thinking instruction should be constituted in a thinking programme, these thinking approaches also typify the divisions in thinking instruction that pervade the literature. That is, whether thinking is best taught as a set(s) of explicit and generic thinking skills — the ‘generalist view’ — or as an implicit and integrated component of subject matter teaching — the ‘specifist view’ (Davies, 2006). The three kinds of thinking instruction approaches can be subsumed under two broad approaches — the skills/generalist approach and the infusion approach, which are now discussed.
The Skills/Generalist Approach

The generalist view is notably influenced by the work of Ennis (1985, 1987, 1992, 1997) in which critical thinking is seen as a universal generic skill; while the specifist view, predisposed by McPeck’s (1981, 1990) arguments, conceives critical thinking ‘as only a loose category taking in diverse modes of thought’ (Moore, 2004, p. 4).

The skills/generalist approach is underpinned by the theoretical understanding that thinking can be taught as a set of universal generic skills. Generalists contend that thinking can be generalizable to a set(s) of cognitive skills and processes which go beyond content and contexts (Ennis, 1992; Paul, 1995); these skills are applicable across various domains and are neither restricted nor dependent on any particular subject area. In this approach, the teaching of cognitive skills is viewed as an end in itself and is therefore the main focus of teaching and learning (Beyer, 1997). This approach parallels Costa’s (2001b) category of the teaching of thinking. Some of the most notable programmes that characterise this approach include de Bono’s CoRT (Cognitive Research Trust) Thinking (1983) and Feuerstein’s (1980) Instrumental Enrichment (FIE).

Beyer (1997) suggests that programmes such as FIE ‘reflect a belief in the need to attend consciously and explicitly to the kinds of thinking being ‘learned’ or improved, unencumbered by concerns for anything else, including subject matter or content’ (p. 237). Proponents of this approach argue that subject matter interferes with students’ engagement and the manner in which they think. When subject matter is in competition with the thinking processes for learners’ attention, the former often prevails. This is primarily due to the nature of subject matter that is seen as more concrete and tangible and therefore more accessible. Consequently, cognitive processes, which are conversely seen as more implicit and abstract, become obscured.

The main strength of the generalist approach is that cognitive skills and processes are the focal point of study. With this approach, there is undivided attention and focus on the improvement of these skills and processes which are unencumbered by other competing priorities. Effectively, this allows
learners wider access to explicit strategies and procedures which would otherwise been unavailable (Gruberman, 2005).

However, there are a number of disadvantages. Beyer (1997) highlights that time becomes a key factor when schools attempt to incorporate special lessons on thinking in an often bloated curriculum. He suggests that in a curriculum that already challenges teachers to cover and fulfil aims and standards, devoting time to exclusive lessons on thinking is often difficult, if not impossible.

A greater issue Beyer (1997) raises with this approach is the 'fragmented and decontextualised' nature of what is taught in such programmes. He argues that the set of cognitive or thinking skills, which are usually unconnected to each other, is often taught in a sequence of disparate entities. The skills are also learnt and employed beyond the contexts in which they are normally applicable. Beyer contends that, consequently, the learning of such skills becomes a 'mechanistic and episodic enterprise' (p. 239), leading to the key role which subject matter and context play in thinking being overlooked.

*The Specifist/Infusion Approach*

The review of thinking instruction approaches in education suggests that theorists largely favour the infusion approach (see for example, Beyer, 1997; Costa, 2001b; Perkins, 1995; Glaser, 1985; Resnick, 1987; Marzano et al., 1988, 2006; Paul, 1995, 2001; Lipman, 2003; Tishman et al., 1995; Ritchhart, 2002). The specifist view or the infusion approach to teaching critical thinking sees it being infused as part of content teaching or where content teaching is blended with the explicit instruction on thinking skills and processes (Swartz et al., 1998). This approach is similar to Costa’s (2001b) teaching for thinking category and is primarily premised on arguments offered by theorists such as McPeck (1990), Glaser (1984) and Resnick (1987). Fundamentally, they assert that for thinking to have any meaning or relevance, it has to occur within a specific context. Thus, this approach places the importance of subject matter as the context for meaning and application of critical thinking skills and processes. As Nickerson (1988) attests in the context of the specifist-generalist debate, 'thinking involves thinking about something;
thinking about nothing is exceedingly hard to do' (p. 48). Hence, for critical thinking instruction to be effective, there has to be a context for thinking for it to be a meaningful and productive enterprise.

It is also on the above theoretical grounds that Nisbett (1990) argues that generic skills programmes such as FIE do not guarantee the transfer of thinking skills as they are devoid of contexts. Echoing Beyer (1997), he also views the teaching of generic skills as being 'fragmentary'. Proponents of the infusion approach contend that thinking is more likely to be transferred if it is incorporated into practice and embedded in all teaching and learning in a 'thinking curriculum' — a curriculum that is explicitly aimed at the development of learners' thinking.

On the importance of infusing subject matter in thinking instruction, Perkins (1995) highlights how this can help in deep conceptual understanding. Similarly, Glaser (1985) stresses the importance of the inextricable and interdependent link between knowledge structures and thinking when he claims that it is 'best to teach thinking and learning skills in specific familiar knowledge domains' (p. 616). In this way, knowledge of content becomes a prerequisite of thinking in the same way that Resnick (1987) and Marzano (1988, 2006) suggest. Some notable programmes influenced by this approach include Marzano's *Dimensions of Thinking* and *Dimensions of Learning* (1988, 1992) and the *Cultures of Thinking* advocated by the Project Zero team at Harvard Graduate School of Education.

However, as Beyer (1997), points out, the infusion approach does suffer from drawbacks. For instance, attending to the explicit teaching of thinking skills can become disruptive to the aim of subject coverage in terms of its depth or breadth. Given that thinking skills are not explicitly part of student assessments, teachers may ultimately be faced with administrative or assessment problems. This is especially so when teachers devote time to teaching 'non-examinable' thinking skills at the expense of subject content which are examinable.
Yet, another weighty issue that Beyer (1997) raises about the infusion approach is linked to the issue of this study — teacher knowledge in the context of critical thinking. The infusion approach in which teachers have to deal explicitly and directly with thinking as part of the infusion requires teachers to ‘know more than many of us [teachers] appear to know about the procedural, conditional and declarative knowledge of various cognitive skills and how best to “teach” it’ (p. 247).

However, I argue that the teacher knowledge requirement applies to any approach of thinking instruction. In agreement with Paul (1995), I contend that for any approach in teaching thinking to be effective, teachers will fundamentally require the prerequisite knowledge of it — the ‘procedural’, ‘conditional’, ‘declarative’ knowledge, as Beyer (1997) suggests. In other words, a teacher knowledge base of critical thinking is essential. The fundamental role of teacher knowledge in critical thinking instruction cannot be underestimated and it is the key perspective of teacher knowledge that informs this study.

**Immersion approach**

Within the broad infusion approach of thinking instruction, a further distinction is made. This distinction centres on the explicitness of the teaching of thinking skills or operations. While these skills are made explicit in the teaching of subject matter in the infusion approach (Ennis, 1989; Beyer, 1997; Swartz, 2001), they are not explicit in the immersion approach (Ennis, 1989).

According to Beyer (1997), proponents of the immersion approach believe it is the very nature of the tasks which demand thinking that consequently leads to the improvement in thinking. The efficacy of the immersion approach can be gauged against the extent of knowledge learned and the extent of ‘thoughtfulness’. A great advantage of the approach is that class time and students’ attention can be fully devoted to subject matter without the distraction of having to attend explicitly to the thinking aspect.

Advocates of the immersion approach also suggest that the subject matter coverage ought to be the main goal of schooling as the improvement of
thinking develops naturally in the process. However, this view runs contrary to the position held by numerous scholars (e.g. Dewey, 1938; Paul, 1995; Scheffler, 1989; Lipman, 2006), who see the development and improvement of thinking and not content knowledge acquisition as the primary goal of education.

**Seeking the middle ground**

Although the generalists’ and specialists’ positions appear dichotomous, others disagree. Davies (2006) suggests that ‘debate’ between the generalists and the specialists involves a ‘fallacy of the false alternative,’ while Chaffee (1994) similarly describes this as a ‘classic false dilemma’. Moreover, the previous discussion of Costa’s (2001b) suggestion of combining the three main types of thinking instruction counters the dichotomous view.

Chaffee (1994) argues that the two teaching approaches are not diametrically opposed to each other, but are instead complementary. He sees both of these approaches playing a key role in the development of students’ thinking. Similarly, Baron and Sternberg (1987) suggest that they are ‘compatible and they deal with different aspects and methods of teaching thinking skills’ (p. 5). Beyer (1997) also appears to support the combined approach, citing cognitive research that indicates learning of a complex cognitive process benefits greatly from the initial and explicit focusing of the process concerned, which the generalist approach essentially offers.

However, while focusing on cognitive skills is necessary, it is not sufficient for the improvement of thinking across subject matter contexts. Beyer (1997) cautions that ‘stand-alone, special thinking skills classes or courses, unless linked directly and purposefully to systematic follow-up instruction in subject matter courses, are not sufficient for accomplishing this goal’ (p. 242). For the improvement of thinking to be effective, the teaching of explicit skills has to be complemented by a focus on the application of the skills across different subject matter domains.

The importance of subject matter in teaching thinking is also stressed by other theorists (e.g. Brandt, 2001; Glaser, 1984; McPeck, 1981; Resnick,
1987). Resnick (1987) asserts that ‘isolated instruction in thinking skills, no matter how elegant the training provided, is unlikely to produce used thinking ability’ (p. 48). Examples of thinking programmes that complement these two basic approaches issues include Stemberg’s (1987) mixed model and Costa’s (2001b) *Teaching For, Of and About Thinking* discussed earlier. Moreover, Lipman’s (1988) popular Philosophy for Children (P4C) programme, which focuses on the notion of a community of inquiry (CoI) can be described as falling within this approach. Although the P4C programme was initially focused on novels that raise philosophical questions, it can be applied across the disciplines (Cam, 2006). Essentially, P4C aims to develop students’ sense of curiosity and critical thinking skills through inquiry and dialogue not only with the teacher, but among students themselves, that is, in effect, through a community of inquiry (Lipman, 2003).

**Teaching critical thinking in the classroom: pivotal elements**

While there are numerous approaches and programmes that can be adopted to develop and improve students’ critical thinking in the classroom as discussed, there are those elements which are especially pivotal to the efficacy of the development of students’ critical thinking.

The most obvious and important element is the teacher. Next to the relevant knowledge, teachers must possess the necessary pedagogical beliefs and dispositions or attitudes that are consistent with the aims of teaching thinking (Duffy, 1994; Golding, 2006a, 2006b; Martin & Michelli, 2001; Zohar, 2004). Paul (1995) argues that effective teaching of thinking requires teachers to eschew teaching that is framed by notions of ‘teaching by telling, learning by memorising’ (p. 293), or what he describes as ‘didactism’. Instead, effective teaching of thinking calls for fundamental assumptions of instruction, learning and knowledge to be cast in progressive terms. These assumptions include seeing learning and the acquisition of knowledge as inseparable from thinking. That is, viewing knowledge and learning as active products of thinking critically, and not products of the passive receipt of information, in which the teacher is seen as the facilitator of learning and thinking (Morrison & Lowther, 2001; Pithers & Soden, 2000; Zohar, 2004), rather than the centre of it. The
task of teaching thinking successfully necessitates constructivist teachers (Martin & Michelli, 2001) — those who possess the pedagogical beliefs and dispositions that are consistent with the aims of critically engaging and developing student thinking.

Another important element is questioning. In terms of being a pedagogical technique, questioning is seen as an indispensable intellectual tool for developing and engaging students’ critical thinking (Beyer, 1997; Costa, 2001b; Dillon, 1990; Ennis, 1990; Marzano et al., Morgan & Sexton, 2006; 1988; Paul, 1995). However, not all questions are equal in terms of their impact in developing and encouraging students’ thinking in the classroom. Closed questions, such as verification questions or those aimed merely at assessing students’ content understanding, do little in terms of developing students’ critical thinking (Costa, 2001c; Paul, 1995). In contrast to closed questions are ‘powerful questions’ — those that ‘evoke in students an awareness of and engagement in the mind’ (Costa, 2001c, p. 360). According to Costa (2001c), powerful questions have three features:

- they are invitational;
- they engage specific cognitive operations at various levels of complexity; and
- they address external or internal content that is relevant to the learner.

(PP. 360-361)

Harpaz and Lefstein’s (2000) notion of ‘fertile questions’ — that which essentially ‘stimulate and motivate the learner to be engaged in a problem at the heart of a studied discipline’ (p. 55) — similarly overlaps with the concept of ‘powerful questions’. Likewise, Paul and Elder (2007) state that Socratic questioning, which can be viewed as a form of powerful questions, is ‘intimately connected with critical thinking because the art of questioning is important to excellence of thought’ (p. 36). Elsewhere, other writers (e.g. Costa, 2001c; Perkins, 2008; Tishman, Perkins & Jay, 1995; Lipman, 1985; Paul, 1995; Swartz, 2001) point to the importance of questioning as a way to develop critical thinking as exemplified by the P4C programme, which is
essentially driven by philosophical inquiry (Lipman, 1985, 2003). Students’ ability to generate questions is also seen as integral in the development of thinking in classrooms (Beyer, 1997; Brooks & Brooks, 2001; Ellsworth & Sindt, 1994; Morgan & Sexton, 2006; Perkins & Ritchhart, 2008; Swartz, 2001). This is because encouraging students to raise their own questions is a source of generation of thoughtful questions that provide further opportunities for thinking critically in the classroom (Beyer, 1998).

The quality of questions raised also impact the nature of classroom interactions — or classroom dialogue — between the teacher and students and among students themselves. This is another important aspect in the development of students’ thinking and learning in the classroom (Mercer, 2002; Mercer, Wegerif & Dawes, 1999; Pontecorvo & Sterponi, 2002; Wegerif, 2007). Closed questions, which are primarily ‘monological’ (Paul, 1995, 2001), that is, they have a definite and set answer, provide little in terms of extending the dialogue between the teacher and students. But this is not the case with the open-ended questions. For example, Socratic questioning probes further reasons, evidence and assumptions of beliefs and opinions in students’ responses, thus, deepening classroom interactions and engaging students’ critical thinking. Such ‘powerful questions’ provide further opportunity for students to be engaged in dialogue and it is the quality of the dialogue that numerous scholars (e.g. Alexander, 2008; Lipman, 2003; Mercer, 2002; Mercer, Wegerif & Dawes, 1999; Paul, 1995, 2001; Wegerif, 2007) contend plays a significant part in improving students’ thinking in the classroom.

Paul (2001) argues that students learn most effectively in the classroom through ‘dialogical situations in which they must continually express their views to others and try to fit others’ view into their own’ (p. 427) and he sees Socratic questioning as one type of dialogical thinking. This is also where dialectical thinking encourages students, using critical insight, to contend their views against that of others. As with Socratic dialectics, the aim behind dialectical exchanges is for students to learn to evaluate and re-evaluate their
arguments against stronger positions, leading to ‘fuller and more accurate’ views (Paul, 1995, p. 527).

The significance of classroom dialogue as an important means to stimulate and extend student thinking and understanding is also echoed in Alexander’s (2008) notion of ‘dialogic teaching’. Similarly, Lipman’s P4C and Col (1985, 2003) thrive and succeed on dialogue and dialogical situations. Further emphasizing the vital role of dialogue in the development of critical thinking, Wegerif (2007) claims that the ‘capacity for dialogue as an end in itself’ (p. 126) is the essential thinking skill in which other critical thinking skills originate.

Others also corroborate the importance of dialogue in the development of students’ thinking. Reporting on a study, Mercer (2002) asserts that classroom dialogue in collaborative class activities is the primary means in which students enhance their critical thinking ability in the form of problem-solving. Echoing him, Pontecorvo and Sterponi (2002), in studying classroom conversations, conclude that ‘narrative activities’ — classroom activities such as debates which essentially rely on classroom dialogue among students and teachers on significant issues — enhance students’ ability to reason.

Thus, while specific strategies and approaches in developing and enhancing students’ critical thinking proposed in the literature might differ, there appears to be consensual recognition that these strategies must be framed within the larger dialogical and dialectical context under the guidance of the teacher with the requisite pedagogical beliefs and dispositions. This is also where the language of thinking (Halpern, 2003; Ritchhart, 2002; Ritchhart & Perkins, 2008; Tishman et al. 1995) becomes a significant means of making thinking visible in the classroom (Ritchhart, 2002; Ritchhart & Perkins, 2007) in which words that denote specific thinking processes such as ‘analyse’, ‘speculate’, ‘evaluate’, ‘hypothesise’ are part of the classroom lexicon.

Collectively, these pivotal elements contribute to the creation of thoughtful classrooms (Beyer, 1997; Ritchhart, 2002) and the culture of thinking (Ritchhart, 2002; Ritchhart & Perkins, 2008). Thoughtful classrooms are
those that are shaped by a culture of thinking 'in which a group's collective as well as individual thinking is valued, visible, and actively promoted as part of the regular, day-to-day experience of all group members' (Ritchhart, undated) and such classrooms are instrumental in the development of students' critical thinking abilities and dispositions (Halpern, 2003; Paul, 1995; Tishman et al. 1995).

This is also where the 'classroom ecology' (Arthur, Gordon & Butterfield, 2003), classroom climate or culture is fundamental in engendering the conducive and positive environment that fosters learning and thinking (Halpern, 2003; Tishman et al., 1995; Ritchhart, 2002). Ritchhart (2002) highlights eight cultural forces that shape the culture of thinking in the classroom. These are:

1. The expectations for students' thinking and learning that the teacher conveys;
2. The routines and structures that guide the life of the classroom;
3. The language that the teacher and students use and the conversations they engage in;
4. The opportunities, work, or activities the teacher creates for students;
5. How the teacher acts and what the teacher models for students;
6. The attitudes that the teacher and students convey;
7. The interactions and relationships between the teacher and the students as well as among the student themselves; and
8. The physical environment and artifacts present in the room. (Ritchhart, 2002, p. 146-147)

It is the nature of the cultural forces which determines the culture of thinking (or its lack thereof) in the classroom. These forces are aptly embedded in the pivotal elements of teaching thinking discussed here in which enacting these elements means manifesting these forces towards the creation of a culture of thinking classrooms.
Teaching thinking in Singaporean education

While the development of student critical thinking only became an official aim with the inception of TSLN, the notion of teaching thinking in Singaporean education, however, predates the launch of TSLN. For instance, de Bono’s (1983) *Cognitive Research Trust* (CoRT) thinking programme was introduced in some schools in 1987 but later in the 1990s, interest began to gravitate towards Marzano et al.’s (1988) *Dimensions of Thinking* (DoT) (1996) and Marzano’s (1996) *Dimensions of Learning* (DoL) framework (Han, 1998). The Gifted Education Programme launched in 1984 also had an emphasis on critical thinking.

Prior to the official launch of TSLN, a thinking programme was piloted by the Ministry of Education in 1996 (Chua & Leong, 1998). This programme was based on Marzano’s DoT (Marzano et al., 1988) and DoL (Marzano, 1996, 2006) framework and by 1999, the pilot programme was formalised into the ‘Thinking Programme’ and was introduced to all secondary schools (MOE, 2000). The introduction of the programme stemmed from an external ministerial curriculum review report released in 1997 which recommended that ‘students should develop critical thinking skills, thereby becoming good creators’ (cited in Chang et al., 2006, p. 1).

The aims of the programme were delineated as follows:

- enable pupils to acquire and understand the core thinking skills and the processes involved in using them;
- apply these skills in the learning of content subjects and in real-life decision-making and problem-solving situations; and
- develop positive habits which would help them become critical, creative and self-regulated thinking learners. (Chua & Leong, 1998, p.3)

The Thinking Programme adopted concurrently two pedagogical approaches — the skills approach and the infusion approach (Chua & Leong, 1998). Skills-based lessons that aimed for the development of generic thinking skills were conducted weekly for 35 minutes per session. However, about 30% of
the curriculum time for teaching core subjects such as English, Science, Mathematics, Geography and History was dedicated to infusion lessons, while 70% of curriculum time presumably was content-focused. In these infusion lessons, teachers were encouraged to create a conducive classroom climate to facilitate the teaching of thinking (Chua & Leong, 1998).

Marzano’s (1988, 1992) frameworks are reflected in MOE’s articulated aim for the development of students’ thinking which is:

> to enable students to acquire and understand core thinking skills and processes, apply skills in learning, decision-making and problem-solving situations and develop habits to become critical, creative and self-regulated thinking learners’. (Curriculum Planning and Development Division (CPDD), MOE, 1998)

This aim, which is one of the core thrusts in the reformed curriculum in the TSLN framework, can be broken down to three distinct sub aims. First, the objective to enable students ‘to acquire and understand core thinking skills and processes’ (CPDD, 1998) can be interpreted as the aim to develop students’ thinking abilities by means of their acquisition and understanding of thinking skills and processes. Second, the aim of enabling students to ‘apply skills in learning, decision-making and problem-solving situations’ (CPDD, 1998) entails the objective of students being able to use thinking skills and processes in the contexts of ‘learning, decision-making and problem-solving’ (CPDD, 1998). Third, the aim to enable students to ‘develop habits to become critical, creative and self-regulated thinking learners’ (CPDD, 1998) denotes the purpose of developing the natural inclinations or dispositions of critical and creative thinking and metacognition in learners. In sum, the thinking aim implies that the reformed curriculum requires that students are not only taught thinking skills and their processes, but that their thinking dispositions are developed as well. MOE’s aim also appears to parallel the multidimensional view of critical thinking that Paul (1995) and Ritchhart (2002), for instance, suggest — that is, critical thinking has a cognitive, characterological and metacognitive dimension. The next section presents
further explication of Marzano’s frameworks that were adopted as part of TSLN.

**Dimensions of Thinking and Dimensions of Learning**

In the absence of an overarching framework in current theory and practice of thinking instruction, Marzano et al. (1988) saw *Dimensions of Thinking* (DoT) as:

> an organizing framework for teaching thinking — a latticework to systematically examine themes common to the different approaches and relationships among them. An appropriate framework [that] would allow practitioners in different subject areas and grade levels to develop a common knowledge base and a common language for teaching thinking. (p. 3)

Their framework, which consists of five dimensions of thinking, was essentially formulated on the basis that these dimensions are reflective of the ‘domains of thinking as they are understood in terms of current research’ (p. 4). According to Marzano et al. (1988), these are:

- Metacognition.
- Critical and creative thinking.
- Thinking processes constituting the macro processes: concept formation; principle formation; comprehending; problem-solving; decision-making; research; and oral discourse.
- Core thinking skills, which are micro level thinking operations that can be considered the ‘building blocks of thinking’. These are: focusing, information-gathering, remembering, organising, analysing, generating, integrating and evaluating skills.
- The relationship of content-area knowledge to thinking in which some aspects of thinking are inseparably linked to content-area knowledge.

The eight categories of ‘core thinking skills’ were chosen as part of the Thinking Programme as they were seen as being key in ‘investigation, problem-solving, and decision-making’ (Chua & Leong, 1998, p. 77).
Consistent with the framework's infusion approach, the programme aimed to help students apply these skills in the context of content subjects learning and in real-life decision-making and problem-solving situations. DoT's (Marzano et al., 1988) strategies to create such climates include open-ended questioning, cooperative learning, using the language of thinking and promoting productive habits of mind.

*Dimensions of Learning* (DoL) (Marzano, 1992, 2005) is another framework that underpinned the Singaporean Thinking Programme. Marzano (1992, 2005), who formulated DoL after DoT, describes it as 'direct descendants of the Dimensions of Thinking' (p. 2). According to him, DoT 'was meant to influence the theory of schooling, whereas its progeny [i.e. DoL] is meant to influence the practice of schooling' (Marzano, 2005, p. 2; emphasis in original). The five dimensions of learning are:

1. Positive attitudes and perceptions about learning.
2. Thinking involved in acquiring and integrating knowledge.
3. Thinking involved in extending and refining knowledge.
4. Thinking involved in using knowledge meaningfully.
5. Productive habits of mind. (Marzano, 1992, pp. 3-14)

Marzano (1992) describes the five dimensions of learning as a 'model of instruction' incorporating 'loose metaphors for how the mind works during learning' (p. 2). Of interest is the fifth dimension, given that the Singaporean Thinking Programme clearly refers to this in its aim. It is the dimension which Marzano suggests is most essential.

Acquiring content knowledge is very important, but ... it should not be the most important goal of the education process. Ultimately, it might be better to help students develop mental habits that will help them learn on their own whatever they need or want to know. (p. 131)

Three domains constitute the Marzano's (1992) productive habits of mind framework. The first domain is self-regulated thinking. These are mental habits that predispose one's own thinking and actions to be more 'self-
regulated' as in the example of being aware of one's own thinking, being sensitive to feedback and evaluating the effectiveness of one's own actions learning. The notion of Marzano's (1992) self-regulated thinking parallels the notion of metacognitive thinking which is a dimension of critical thinking defined by Paul (1995) as: 'thinking about your thinking while you are thinking to make your thinking better' (p. 91).

The second domain is critical thinking. This is the characterological dimension of critical thinking that stresses the importance of certain mental habits as echoed by Ritchhart's (2002), Ennis's (1991) and Paul's (1995) notions of critical dispositions. These dispositions include being accurate and seeking accuracy, being clear and seeking clarity, being open-minded, restraining impulsivity, taking a position when the situation warrants it and being sensitive to others' feelings and level of knowledge.

The third domain is creative thinking which is seen as complementary to critical thinking, but is characterised by a different set of mental habits. Examples of these habits include engaging intensely in tasks even when answers or solutions are not immediately apparent, pushing the limits of one's knowledge and abilities and generating, trusting, and maintaining one's own standards of evaluation. Here, Marzano's (1992) view of the complementary nature of creative and critical thinking overlaps that of Paul's (1995) who sees the relationship of creative and critical thinking as 'inseparable, integrated, and unitary' (p. 196), as discussed earlier.

MOE's incorporation of the generalist and infusion approaches to the teaching of thinking illustrates the option to complement the strengths of both. While official ministerial documents do not explicitly subscribe Marzano's (1988, 1992) frameworks as part of TSLN, it is evident that they have influenced the formulation and aims of the articulated thinking objective:

to enable students to acquire and understand core thinking skills and processes, apply skills in learning, decision-making and problem-solving situations and develop habits to become critical, creative and
self-regulated thinking learners. (CPDD, MOE, 1998; emphasis added)

However, while the Thinking Programme incorporates both the generalist and infusion approach to the teaching of thinking, such efforts may be counterproductive in the context of the curriculum. The generalist approach, as mentioned, possesses disadvantages (Beyer, 1997). Perhaps, these disadvantages could collectively be one reason why the MOE mandated Thinking Programme is known to have ceased in its original form. Such a centrally mandated programme also appears to be untenable and inconsistent with increasing ministerial efforts to accord greater school autonomy that gives schools the freedom to prioritise and implement their own programmes to fulfil the TSLN thinking thrust (Tan, personal communication, August 17, 2008). But in spite of the cessation of the programme, recent TSLN initiatives, such as TLLM, and ministerial documents clearly continue to stress the importance of thinking in the curriculum as similarly espoused by the delineated aims of the programme.

Summary

Part II of Chapter 2 discussed the following in relation to critical thinking:

* the importance of critical thinking in education and preparation of school leavers to participate in a rapidly changing world;
* the various definitions of critical thinking found in the literature;
* the argument for an expansive rather than a reductionist perspective of critical thinking that provides a conceptual reconciliation of various terms and a wider platform to understand the dimensions and depth of participants' understandings of critical thinking in the study;
* the different approaches to teaching critical thinking and its pivotal elements; and
* the explication of the framework that guided the unprecedented Thinking Programme under TSLN.
Part III of Chapter 2 discusses teacher knowledge, which is a key theoretical perspective taken in this study.
PART III

TEACHER KNOWLEDGE AND TEACHER PRACTICE

Introduction

Part III of Chapter 2 focuses on teacher knowledge. However, given its extensive literature (Munby, Russell & Martin, 2001), the review of the literature is limited to the aspects pertinent to this study. In particular, the seminal concept of pedagogical content knowledge (PCK) (Shulman, 1986, 1987) is reviewed and its appropriateness as a heuristic tool to understand teacher knowledge and practices in the context of teaching thinking is discussed. In light of the study's aim to explore possible links between teachers' knowledge base of critical thinking and their pedagogical actions, previous studies focusing on the relationship between teacher knowledge and teacher actions are also examined.

A heuristic tool for research in teacher knowledge

Three overlapping areas are influential in the meaning of learning to teach: information processing; practical knowledge; and pedagogical content knowledge (PCK) (Carter, 1990). Information processing studies, which focus on the cognitive processes that teachers use in thinking about teaching, are informed by a psychological framework. However, teachers' practical knowledge refers to the knowledge that is tied to classroom settings and practices and shows the complex processes of interactive teaching and thinking-in-action. As Munby et al. (2001) point out ‘[practical knowledge] includes both personal, practical knowledge that is based on the personal understandings that teachers have of the practical circumstances in which they work and classroom knowledge that is situated in classroom events’ (p. 880).

In contrast, PCK is viewed as domain specific and involves what teachers know of subject matter and how this knowledge is manifested in classroom practices. The concepts of practical knowledge and PCK are distinguished by the idea that the former is linked to personal and situational factors, while the
latter is based on a sense of collective wisdom in the profession (Carter, 1990).

However, the articulation of the links between teacher knowledge and practice is a challenging enterprise for a number of reasons (Berry, Loughran & van Driel, 2008) — one reason being the various definitions of knowledge proffered in the literature, such as craft knowledge (Grimmet & MacKinnon, 1992), pedagogical content knowledge (Shulman, 1986, 1987) and personal practical knowledge (Carter, 1990). Their inherent differences influence what researchers focus on in terms of a teacher knowledge base and how such knowledge shapes teaching practices. Other reasons include the often tacit nature of the links between knowledge and practice for many teachers (Schön, 1983) and the perceived lack of the need for it to be articulated by teachers who are focused more on ‘doing teaching’ rather than engaging in explicit pedagogical reasoning (Loughran, Berry & Mulhall, 2004; Loughran, Milroy, Berry, et al., 2001).

Nonetheless, scholars argue there is an increasing need to better understand teaching in subject areas like Science (e.g. Abel, 2008; Berry, Loughran & van Driel, 2008) and I contend that there is also a similar need to understand teaching in the context of proliferating curricula that explicitly emphasize critical thinking, as discussed earlier. In this respect, Shulman’s (1986, 1987) notion of PCK presents itself as a useful heuristic tool for the articulation of the teacher knowledge base within the context of teaching thinking in the TSLN policy.

**Pedagogical content knowledge: its nature and development**

Shulman’s (1986, 1987) framework of pedagogical content knowledge (PCK) has been widely used for research on teacher knowledge, teacher practice and teacher learning. Such has PCK’s influence been over the last two decades in teacher research, it has been described as ‘approaching the status of a paradigm’ (Abell, 2008, p. 1410). Despite this, there is an absence of a consensual definition of PCK (Abell, 2008; Gess-Newsome, 1999; van
Driel, Verloop & de Vos, 1998) and disagreement about what the construct actually entails (Loughran, Mulhall & Berry, 2003).

Shulman (1986), who first coined the concept, views PCK as ‘that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding’ (p. 8). It is further described as ‘the most useful forms of [content] representation ... the most powerful analogies, illustrations, examples, explanations, and demonstrations — in a word, the ways of representing and formulating the subject that makes it comprehensible for others’ (Shulman, 1986, p. 9). Perceived primarily as ‘a form of content knowledge composed of subject matter transformed for the purposes of teaching’ (Munby et al., 2001, p. 881), PCK encouraged much research on the relationship between subject matter or content knowledge and pedagogical knowledge. It is one of the seven knowledge categories that Shulman (1986) conceives the teacher knowledge base to comprise:

1. content knowledge;
2. general pedagogical knowledge;
3. curriculum knowledge;
4. pedagogical content knowledge (PCK);
5. knowledge of learners and their characteristics;
6. knowledge of educational contexts; and
7. knowledge of educational ends, purposes and values.

Although there are seven categories in Shulman's teacher knowledge base, it is his seminal construct of PCK that has been most influential, as shown by its numerous conceptual reconfigurations since its initial formulation (see for example, Appleton, 2002; Barnet & Hodson, 2000; Cochran, DeRuiter & King, 1993; Gess-Newsome & Lederman, 1999; Grossman, 1995; Hasweh, 2005; Loughran, Mulhall & Berry, 2006). For instance, Cochran, De Ruiter and King (1993) argue for a revision of PCK to incorporate a more constructivist dimension — pedagogical content knowing. In their studies, Cochran and Jones (1998) suggest that PCK is more complete in experienced teachers as
opposed to beginning teachers, and that the act of teaching itself increases teacher content knowledge. Furthermore, they found that experienced teachers, as opposed to inexperienced teachers, have more complete PCK and it is experience that is attributable to the expansiveness of teacher knowledge. These studies do give credence to Cochran et al.'s (1993) revision of PCK to pedagogical content knowing which incorporates a more constructivist dimension.

Like Cochran et al. (1993), Hasweh (2005) also calls for a ‘reconfiguration’ of PCK and raises a number of criticisms against the treatment of the construct. He points to researchers who revise PCK as ‘a category of knowledge that curiously seems to be able to encompass all other categories of teacher knowledge and beliefs’ (p. 274), contrary to Shulman’s (1986) original conception of it as ‘that special amalgam of subject matter and pedagogy’ (p. 8).

Hasweh (2005) further suggests that some researchers disregard the topic-specificity characteristic of PCK in which ‘it has become synonymous with teacher knowledge and beliefs, and even practices for some’ (p. 274). In agreement with Gudmundsdottir’s (1995) view that PCK has a value or beliefs component, he calls for PCK to be viewed ‘as a collection of teacher pedagogical constructions, as a form of knowledge that preserves the planning and wisdom of practice that the teacher acquires when repeatedly teaching a certain topic’ (p. 290). In this regard, Hasweh’s conception of PCK echoes that of Cochran et al.’s (1993) revision; one that incorporates a distinct constructivist and experiential dimension that is developed through practice and experience rooted in classroom practice (van Driel, et al., 1998). Therefore, it is also presumed to be more complete in experienced teachers than in beginning teachers.

On the other hand, Grossman (1989, 1990) views PCK as comprising four knowledge components: ‘overarching conceptions of what it means to teach a particular subject; knowledge of curricular materials and curriculum in a particular field; knowledge of students’ understandings and misunderstandings of a subject area; and knowledge of instructional
strategies and representations for teaching particular topics' (p. 25). In this regard, PCK is developed as ‘a process of knowledge transformation’ in which reciprocal links among the components exist (Nilsson, 2008, p. 1283).

However, other writers reconceptualise PCK as involving three primary domains. Nilsson (2008) views subject matter knowledge, pedagogical knowledge and contextual knowledge as being essential to PCK. Similarly, Barnet and Hodson (2000) incorporate the significant dimension of context in their reconceptualisation of PCK as pedagogical context knowledge in which PCK is context dependent. These revisions of PCK seem to characterise the four essential features of PCK identified by Abell (2008):

1. PCK includes discrete categories of knowledge that are applied synergistically to problems of practice;
2. PCK is dynamic, not static;
3. content is central to PCK; and
4. PCK involves the transformation of other types of knowledge. (p. 1407)

Although these features were captured in the context of Science teaching (Abell, 2008), I argue that they apprehend the key nature of PCK as a theoretical construct in understanding teacher knowledge and practice in the context of my study of critical thinking. These characteristics respectively imply that: the components of PCK are employed in an integrated manner during teaching and rooted in practice; teachers develop PCK over time from teacher preparation programmes, experience and professional development; PCK is operationalised during teaching specific subject matter content; and PCK involves the interaction of the other domains (see Table 2) and thus is not an independent category of knowledge.
Table 2: Key knowledge domains in pedagogical content knowledge

<table>
<thead>
<tr>
<th>Pedagogical knowledge</th>
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<tbody>
<tr>
<td>Pedagogical knowledge comprises general elements of teaching, classroom organisation and communication and instructional strategies (Nilsson, 2008), which need to be adapted to particular teaching contexts (Morine-Dershermer &amp; Kent, 1999).</td>
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<tr>
<th>Context knowledge</th>
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<tr>
<td>Context knowledge is linked to PK and includes the knowledge of school departments, traditions, student behaviours and classroom climate.</td>
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<table>
<thead>
<tr>
<th>Subject matter knowledge</th>
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<tbody>
<tr>
<td>Subject matter knowledge refers to a teacher’s quantity, quality and organisation of information, understandings and underlying concepts in a given discipline.</td>
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**Development of pedagogical content knowledge**

PCK is known to be developed in a number of ways. Consistent with the notion that PCK is a dynamic entity, Abell (2008) and Grossman (1990) suggest that PCK is developed over time from sources such as teacher preparation programmes and professional development. Coursework modules taught during teacher preparation are designed to provide new teachers with the knowledge of what teaching a specific subject involves together with the specific pedagogical strategies to teach the subject.

However, Hasweh (2005) stresses the association of PCK with experience and suggests that PCK does not necessarily develop with pre-service education. He cites his earlier study (Hasweh, 1985) involving experienced and inexperienced Science teachers which indicate that the former needed less lesson planning as they referred to their previous knowledge in teaching the subject. This contrasts with the latter who needed more planning to figure out the ‘analogies’ and ‘examples’ to teach a specific topic.

The key role of experience in the development of PCK is also noted by others. Abell (2008) cites the ‘authority of experience’ (Munby & Russell, 1985) as being important. Similarly, Bullough (2001) cautions that the development of PCK must also occur within the in-service teaching context rather than during pre-service alone. The importance of teaching experience in the growth of PCK is illustrated by Cochran et al.’s (1993) revision of PCK as ‘pedagogical content knowing’ which underscores its constructivist element. This notion is evidenced by Cochran’s and Jones’ (1998) study of experienced and
inexperienced teachers that points to the more complete nature of PCK in experienced teachers.

Apart from accrued teaching experience that develops PCK, reflections are also seen as the foundations of PCK. Magnusson, Krajcik and Borko (1999) emphasize that apart from the content to be taught and the context in which it is taught, reflections on teaching experiences are a significant determinant in the development of PCK. This is supported by studies conducted by De Jong, van Driel and Verloop (2005) and Nilsson (2008). Collectively, their research identified the importance of teachers' reflections on their practice yielding significant shifts in their conceptions of Science teaching and learning during pre-service education. It is these processes that importantly lead to the development of PCK. However, Grossman (1989) also cites that beginning teachers can resort to their subject matter knowledge and the 'apprenticeships of observations' (Lortie, 1975) as other sources of their PCK.

**Pedagogical content knowledge: the pathway to understanding the teacher knowledge base in thinking curricula**

The PCK concept can provide the basis for an analytical framework in the study of the implementation of thinking in an educational system such as in the case of TSLN. I suggest that the engagement with the framework provides an entry point to begin understanding how the notion of the teacher knowledge base can be reconceptualised in the context of critical thinking curricula. It offers possibilities for a coherent way of reconceptualising the teacher knowledge base and practice of thinking.

However, while the PCK construct informs the study into teacher knowledge and practice, it cannot be assumed that such conceptualisations or representations of teacher knowledge are actual neat compartmentalisations in a teacher's mind. Borko and Putnam (1996) warn of such representations of knowledge:

> A potential danger inherent in any description of categories of knowledge is that people may come to see the categories as representing an actual storage system in the human mind rather
than a heuristic device for helping us think about teacher knowledge ... we may find ourselves thinking that teacher knowledge is organized into abstract ... discrete categories ... in fact, what teachers know and believe is completely intertwined, both among domains and within actions and context. (p. 677)

However, while Borko and Putnam (1996) caution against this 'danger', Philips (1996) argues against the unjustified dismissal of such 'heuristic' devices:

The aim is to sensitize readers to the important role played by the underlying models or analogies, and to argue for flexibility, tolerance, and caution in dismissing [in the name of Science] models that rivals one's own, especially when those models and metaphors embody different major assumptions about the nature of human phenomena. (p. 1017)

This tension, therefore, presents a challenge. On the one hand, there is a need to 'sensitize' readers with the research by appealing to these frameworks or 'representations'. On the other hand, this need runs the risk of readers coming to view such representations as actual entities and not merely as heuristic devices to understand teacher knowledge and/or beliefs. As such, the challenge presented to this study is the task of distinctly demarcating these boundaries — between that of the theoretical dimension and that of actual practice — by consistently articulating it.

**Teacher knowledge and teacher beliefs: overlaps and distinctions**

In the PCK literature, there is generally little distinction between what constitutes knowledge and what constitutes beliefs. It would appear that only Hasweh (2005) and Gudmundsdottir (1999) explicitly suggest that PCK incorporates a value and beliefs component, while others (e.g. Abell, 2008; Cochran et al., 1998; Grossman, 1989; Nilsson, 2008; Shulman, 1986, 1987) do not seem to make any distinctions between knowledge and beliefs.
Munby et al. (2001) suggest that differences between teacher knowledge and beliefs can be distinguished by the condition of truth in the philosophical sense where ‘beliefs as propositions, do not have to satisfy a truth condition, but knowledge claims do’ (p. 884). Others, including Richardson (1996), argue that ‘there is also considerable similarity between the terms knowledge and beliefs in the concept of personal practical knowledge’ (p. 104). Similarly, Pajares (1992) in referring to teacher beliefs as a ‘messy construct’ remarks that terms such as ‘values’, ‘predispositions’, ‘attitudes’, ‘opinions’, ‘perceptions’, and ‘personal ideologies’ seem to carry similar meanings. However, he does point out a distinction between beliefs and knowledge — belief is based on judgment and evaluation, while knowledge is based on objective fact.

While this may be so, some reviews of the literature on teacher knowledge do not explicitly point to these distinctions or their ensuing implications. Fang (1996) and Kagan (1992) in their review of studies on teacher beliefs, for instance, point to the connection between teacher beliefs and their instructional practice and also suggest how they can be resistant to change, without explicitly distinguishing the notions of teacher beliefs and teacher knowledge. Instead, both these terms seem to have been treated as somewhat analogous of each other. It is little surprise then that Tobin, Tippins and Gallard (1994) remark that there is an absence of a common use for the term ‘belief’ in teacher education.

In the context of my study and this review of the literature, I make a slight distinction between the two concepts although, at times, like the various PCK knowledge domains, they cannot always be teased apart, especially in the data analyses. My reference to the concept of belief is consistent with Pajares (1992) in which belief is based more on judgment and evaluation, while knowledge is based on fact. In this sense, teacher beliefs have normative and affective elements, while teacher knowledge pertains to more cognitive aspects (Zohar, 2004). This includes, for instance, knowledge of subject-matter, pedagogy and curriculum and classroom management, context of teaching, and education (Ernest, 1989) which, in other words,
denote the knowledge domains associated with PCK that have been discussed previously.

**Examining links between teacher knowledge, beliefs and teacher action**

The literature review on research that examines the relationship of teacher knowledge with teacher actions or practices reveals that studies generally centre on the fields of reading and literacy, Mathematics and Science. Few have, in fact, examined how teacher beliefs and/or knowledge influence teachers’ enactment of critical thinking in the classroom. In the field of Mathematics, Aguirre and Speer (2000) suggest that beliefs about the nature of teaching, learning and Mathematics are especially influential on teachers’ practice when these beliefs manifest themselves during the different phases of classroom interactions. Similarly, Wilkins (2008) found that teacher knowledge, beliefs and attitudes have the strongest influence on practice when they are linked to teachers’ instructional practices.

In the study of reading and literacy, Richardson, Anders, Tidwell and Lloyd (1991) demonstrate that the beliefs of teachers are linked to their classroom practices in the teaching of reading comprehension, while in Science teaching De Jong, Korthagen and Wubbels (1998) examined several studies which show a lack of basic knowledge of important concepts among teachers is reflected in their practice.

Furthermore, in a study that pertained to the teaching of higher-order thinking, Onosko (1990) investigated the relationship between the thoughts about instructional goals and practice of two groups of teachers. One group of teachers had a clear and committed stated goal of student engagement with higher-order thinking, while the other did not. Following the findings that illustrate emergent differences between the two groups, Onosko suggested a corresponding link between teachers’ beliefs and theories, and their practices in the classroom.

Although these studies suggest that teacher knowledge and beliefs influence their practices, other studies suggest this not to be the case. Reasons
include teachers holding contradictory beliefs, teachers having a lack of subject matter knowledge, and the existence of impeding classroom factors. Brickhouse (1990) in his study of two experienced teachers and a beginning teacher found that the latter seemed to have been constrained by obstacles that hindered him from employing teaching practices that were consistent with his professional beliefs.

However, in her research on a beginning Mathematics teacher, Raymond (1997) found that the teacher's beliefs and practice were not entirely consistent. The teacher's practice also appears to be more closely linked with beliefs about Mathematics content rather than beliefs about Mathematics pedagogy. In other words, beliefs appear to be linked to the teacher's subject matter knowledge and PCK in the subject. Raymond also found that the teacher's experiences as a student highly influenced her beliefs about Mathematics content, while teaching practice largely influenced beliefs about Mathematics pedagogy. In addition, she found that teacher preparation had limited influence on teacher beliefs and practice, also suggesting the resistant nature of teacher beliefs.

Similarly, studies by De Jong, Acampo and Verdonk (1995) and Huibregtse, Korthagen and Wubbels (1994) point to the inconsistency in the link between teachers' beliefs and practice. Their studies found that while teachers held beliefs about student-centred learning, they generally taught in didactic and prescriptive ways. Teachers often perceived these teaching methods to be time-effective and clear, and able to arrest students' attention. Richardson et al.'s (1991) study also showed that a teacher's beliefs did not link to her practices. They found that the teacher was in the process of changing her beliefs and practices and that the changes in the teacher's beliefs preceded changes in her practices.

Furthermore, in their study, De Jong et al. (1998) pointed to the lack of teachers' subject matter expertise in Science, or subject matter knowledge, which impeded their ability in teaching practices. Also, Fang (1996) points to Duffy and Anderson's (1984) study which found that although literacy teachers were able to profess their beliefs about reading outside of the
classroom, their actual classroom practices were determined by factors inherent in the classroom such as teacher-student rapport, student abilities and classroom management; in other words, their context knowledge (Abell, 2008; Nilsson, 2008). Similarly, Kinzer (1998) and Readence, Konopak and Wilson (1991) suggest in the findings of their study that the relationship between teacher beliefs and instructional practices varies, from being highly consistent to inconsistent.

However, it must be noted that the potency of teacher beliefs as a determining factor in teacher action is also illustrated by some studies that suggest teacher beliefs are highly resistant to change (Richardson, 1996; Block & Hazelip, 1995). Complexities of the classroom and external and situational factors can easily impact teachers' abilities and beliefs (Barnet & Hodson, 1999; Nilsson, 2008; Roehler & Duffy, 1991) as they adjust and reposition themselves to address tasks before them. This is also where, in the classroom, the teacher is seen as a ‘dilemma manager’ (Lampert, 1985). In the face of a host of competing priorities, which include an array of pedagogical decisions, ‘they have to come up with coping strategies, by calling upon the conflicted ‘self’ as a tool of ... trade and building a working identity that is constructively ambiguous, in order to combat these pedagogical dilemmas’ (Fang, 1996, p. 54).

Similarly, Davis, Konopak and Readence (1993) suggest that variance in the relationships among knowledge and/or beliefs and practice can be attributed to the psychological, social and environmental realities of the school setting and that the school policies and priorities can impact this relationship. In terms of the PCK framework, the knowledge domains can be thought of as impacting and interacting with one another in practice, but in which factors external to the teacher are also influential.

The aforementioned research findings are unsurprising if they are considered alongside Clark and Peterson’s (1990) model of teacher action. They suggest that, in one way or another, teacher knowledge and/or beliefs can be thought of as having an influence on teacher action. This is more so as the curriculum is interpreted and acted upon within the psychological context of teaching that
constitutes the thinking, planning and decision-making of teachers. As Clark and Peterson (1990) point out:

The thinking and planning and decision-making of teachers constitute a large part of the psychological context of teaching. It is within this context that curriculum is interpreted and acted upon; where teachers teach and students learn. Teacher behaviour is substantially influenced and even determined by teachers' thought processes. (p. 53)

Therefore, teacher behaviour is greatly affected and determined by teacher thought processes that are in turn determined by teacher knowledge base, or beliefs, as the previously discussed studies and others suggest (e.g. Anders & Evans, 1994; Schommer, 1994; Stoddert, 1994).

In articulating the relationship between teacher thoughts and actions, Clark and Peterson (1990) propose a model (see Figure 1) which is instructive in illustrating the links between teacher knowledge and action suggested in the aforementioned studies. Their model assumes that the relationships among teacher behaviour and teacher knowledge and/or beliefs and/or theories, and student behaviour and student achievement are reciprocal. In addition, the circular model of teacher actions and their observable effects allow for the possibility that teacher behaviour affects student behaviour, which in turn reciprocally affects teacher behaviour and ultimately student achievement. Earlier studies (Cobb, Wood, Yackel, et al. 1991) have also empirically drawn the link between teacher knowledge, which is a function of teacher behaviour, and student learning. In illustrating the reciprocal links, student achievement may also affect teacher behaviour, which then affects student behaviour and student achievement.

Clark and Peterson (1990) further argue that a ‘complete understanding of the process of teaching is not possible without an understanding of the constraints and opportunities that impinge upon the teaching process’ (p. 61).
Figure 1: A model of teacher thought and action (Source: Clark & Peterson, 1990, p. 39)
As such, their inclusion of the notions of 'constraints and opportunities' in the model illustrates the way in which teacher actions may be influenced — either in being constrained by factors such as the school’s physical setting, management, administration or the curriculum in some cases, or in being given opportunities to behave in a certain way in other cases. These factors are also suggested in the studies on the relationship between teacher knowledge and/or beliefs and teacher practices discussed earlier. Therefore, in light of Clark and Peterson’s (1990) model, teacher knowledge, beliefs or conceptions have a great propensity to influence the manner in which teachers approach their pedagogy and curriculum implementation (Wilson, Readence & Konopak, 2002; Flores, 2001; Pajares, 1992) and how their knowledge domains might interact and be impacted.

The discussion of key studies on the relationships among teacher beliefs and/or knowledge, and practice leads to an unequivocal conclusion — a rich complexity exists in the individual experiences of teachers. Like their professional growth, these experiences can also be seen as a ‘highly intimate, intrapersonal affair’ (Kagan, 1992, p. 81). At the same time, a constant flux of dynamics seems to interact and impinge on teachers’ knowledge base and beliefs, and their practices so that each teacher’s case is seen as idiosyncratic. As the idea of context knowledge in PCK suggests, these dynamics are shaped by the situational contexts of teachers. Context knowledge also alludes to the reciprocal links between the teacher knowledge domains and actions, and how both impact student behaviour.

**Summary**

Part III of Chapter 2 examined the literature on teacher knowledge and teacher practice and in particular:

- introduced the concept of PCK as a heuristic tool for understanding the articulation between teacher knowledge and teacher practice in the context of critical thinking;

- discussed the sources and development of PCK; and
• reviewed the studies centring on the links between teacher knowledge and/or beliefs and teacher action to illustrate their relationships and dynamics.

Building on the foundations laid in Part II and Part III of Chapter 2, Part IV discusses the combined domains of teacher knowledge and critical thinking, while studies in this area are also examined.
PART IV

CONNECTING DOMAINS: TEACHER KNOWLEDGE AND CRITICAL THINKING

Introduction

Part II and III of Chapter 2 respectively discussed critical thinking and teacher knowledge. Part IV reviews the combined domains of teacher knowledge and critical thinking. I begin by reviewing the literature that has examined these two areas and reveal the gaps in the literature, highlighting the contributions this study seeks to make, and conclude with the examination of a framework that was used in a study of teacher knowledge in the context of critical thinking.

Research on teacher knowledge and critical thinking

The search for literature combining the two areas of teacher knowledge and critical thinking reveals a paucity of studies. Previous research on teacher knowledge has, for example, looked at teacher knowledge in relation to the instruction of domain specific subjects (e.g. Dixon, Moss, Ferguson et al., 2006; Nagappan, 1998; Zohar, 2004; Zohar & Schwartzzer, 2005), while previous studies on critical thinking centred on the teaching of critical thinking per se (e.g. Reed, 1998; Ritchhart, 2002 ). In the Singaporean context, only studies of teacher knowledge in relation to Information Communication Technology (Lim & Chai, 2004) were located apart from a longitudinal study on the efficacy of Lipman's (1988) Philosophy for Children (P4C) thinking programme in a primary school (Chang et al., 2005) and a study of a Singaporean school's journey as a learning organisation (Retna, 2007).

Zohar (2004) and Zohar and Schwartzzer (2005), in one of the very few studies in these two areas, also suggest that little is known on the relationship between teacher knowledge in the context of critical thinking, or what they referred to as higher-order thinking in their studies. As such, another important purpose of this research is to make a contribution to current literature at both the international and Singaporean level in the area.
Studies on teacher knowledge and critical thinking include those conducted by Grosser and Lombard (2008), who examined prospective teachers' critical thinking abilities; Jungwirth (1990), Brownell, Jadallah and Brownell (1993), who studied teachers' critical thinking abilities; Zohar (2004) and Zohar and Schwartz (2005) who researched teacher knowledge and thinking instruction in the teaching of Science, and the Victoria's DET's (Department of Education and Training) study on the area of PCK and the thinking domain in VELS (Victorian Essential Learning Standards) (Dixon, Moss, Ferguson et al., 2006).

Other studies include Gruberman's (2005) that examined the various processes by which teachers come to form understandings of higher-order thinking and how these are transferred into practice, and Nagappan’s (1998) study which explored teachers' perceptions of their preparedness in teaching higher-order thinking and how it is taught in the language classrooms. While these studies touched on some aspects of teacher knowledge and critical thinking, they were not their focal point. For instance, Grosser and Lombard (2008), Jungwirth (1993) and Brownell et al. (1994) investigated teachers' critical thinking abilities per se. DET's study (Dixon et al., 2006) focussed on PCK and thinking instruction but it did not fully examine the issues raised in the relationship between PCK and thinking instruction. Zohar and Schwartz's (2005) study assessed PCK in the context of higher-order thinking, but it centred exclusively on the teaching of Science, whereas my study's focus is English, Language Arts and Humanities subjects.

**Teachers, teacher knowledge and teaching thinking**

Although the aforementioned studies were done in their local contexts — Israel, Australia, Malaysia and America — and albeit with differing aims, they nevertheless provide key insights into the situating of my research. The studies conducted by Grosser and Lombard (2008), Jungwirth (1990) and Brownell et al. (1994) collectively show that the critical thinking abilities that teachers are supposed to develop in students within the thinking curriculum are not evidenced in teachers themselves. Unlike their studies, my study's
explicit aim is to understand teachers’ knowledge base and practice of critical thinking rather than to assess their critical thinking abilities per se.

Nagappan (1998) and Gruberman’s (2005) studies are the most relevant to my study as they, in effect, link similar issues of teacher knowledge in the context of teaching critical thinking, or higher-order thinking in their cases. Nagappan’s notable findings that pertain to my study include:

- teachers do not perceive themselves as being adequately prepared in teaching higher-order thinking in which these perceptions are linked to teaching experience;
- teachers lack pedagogical content knowledge needed to teach higher-order thinking;
- there are inconsistencies between teachers’ beliefs and practices;
- educational mandates for higher-order thinking and teacher education and professional development have little impact teachers’ pedagogy; and
- curricular demands are constraints in teaching higher-order thinking in the classrooms.

Gruberman (2005), in his study, looked at the manner in which teachers conceptualise higher-order thinking and how they transfer this into practice. His findings report how teachers acquire their understandings, thus providing insights into how teachers construct their knowledge base to teach thinking. His study also reveals the factors that affect teachers’ understandings of higher-order thinking and the constraints of teaching it. Teachers’ thinking dispositions were found to influence their conceptualisations and practice of higher-order thinking, and the school’s culture and support for teaching thinking also had some bearing on the way teachers conceptualise higher-order thinking.

My study intersects and connects with aspects of both Gruberman’s (2005) and Nagappan’s (1998) studies. In similarly examining teachers’ pedagogical knowledge and perceptions of critical thinking and the factors that influence
their teaching of it, my research incorporates the PCK framework to understand the nature and dynamics of the teacher knowledge base and practice in the context of critical thinking. It also brings into consideration the dynamics of the grade level taught and teaching experience, while attempting to examine how these impinge on the teachers' knowledge base and their implementation of critical thinking. Moreover, my investigation includes the perspectives of students and, as such, attempts at gaining a more holistic understanding from both teachers' and students' perspective in the context of teaching thinking.

Importantly, however, Nagappan (1998), Gruberman (2005) and Zohar and Schwartz's (2005) studies collectively suggest some key themes. One, pedagogical knowledge is a function of teachers' implementation of thinking in the curriculum. Two, the teacher knowledge base, which includes teachers' attitudes towards thinking instruction, is the cornerstone of effective educational reforms or programmes that aim to teach thinking. Another salient theme emerging from their studies is that the teacher knowledge base of thinking directly impacts student learning and outcomes, which in turn influences the efficacy of the thinking curriculum implementation.

In supporting these studies, DET's study (Dixon et al. 2006) more broadly indicate that teachers' PCK in relation to the 'thinking domain' in VELS needed to be developed and supported. In extending this point, Gruberman's (2005) findings indicate that teacher education, the school culture and the level of support teachers receive all influence teachers' conceptualisations and teaching of higher-order thinking, which my study, as discussed earlier, equates with critical thinking (Paul, 1995).

Another study undertaken by Leat (1999) on the implementation of the Thinking Skills programme in the UK identified a number of concerns. He noted the crucial role of the teacher in the effective implementation of thinking in the curriculum and points to the importance of teacher efficacy, which Woolfolk and Hoy (1990) also recognized is the function of successful thinking initiatives implementation.
Moreover, Golding (2006a), in his discussion of teaching thinking in schools, argues that both the school and teachers are fundamental in the effective integration of thinking into the curriculum. He noted that some schools were implementing thinking in a ‘shallow way’ and that the enactment of it was merely seen as ‘a grab-bag of thinking tools and strategies’ (p.4). In effect, he suggests that this was attributable to teachers’ lack of a knowledge base of thinking instruction and schools’ general attitude in largely remaining ‘results focused and content driven’ (p. 4). Golding argues that a true ‘Thinking School’ is one that incorporates thinking as an all encompassing philosophy in which the school’s practices, culture, and surroundings all advocate and encourage good thinking. Like Ritchhart (2002), he acknowledges that ‘thinking that is reasonably flexible, reflective, and productive in achieving its ends or goals with regards to making decisions, solving problems, or developing understanding’ (p. 21) is the effective equivalent of good critical thinking. As such, successful ‘Thinking Schools’ demand a deep paradigm shift across all levels and facets of the school to achieve an effective implementation of thinking in the curriculum.

Elsewhere in the literature, Paul (1995) warns against the lack of understanding about the teaching of critical thinking which can be detrimental and leads to what he refers to as ‘pseudo critical thinking’ and ‘cooperative mis-learning’ that do more harm than good (p. 48). This is attributed to teachers’ lack of understanding of critical thinking which directly affects the thinking instruction ‘know-how’. Paul further argues that this inadequacy cannot be overcome by a one-off teacher development course on teaching critical thinking, but requires sustained professional learning. In addition, he points to findings that suggest teachers are likely to teach in the way in which they were taught — or the apprenticeship of observation (Lortie, 1975) — stating that ‘we are caught in a vicious cycle of mediocre practice model … of trivialized knowledge’ (p. 19).

The discussion of the literature in this section raises questions about the role of an adequate teacher knowledge base in relation to the implementation of thinking instruction, or of curricula that explicitly emphasize thinking. The
notion of a teacher knowledge base in thinking instruction is also a salient, recurrent theme. Nagappan’s (1998), Gruberman’s (2005) and Leat’s (1998) studies collectively concur that the efficacy of teacher knowledge determines outcomes in curricular reforms that explicitly focus on the development of thinking. This includes the ways in which teachers’ knowledge shapes and impacts their thinking instruction. Thus, teachers are pivotal in implementing educational change and initiatives through their enactment of the curriculum. They are the ones who ‘don’t merely deliver the curriculum [but] develop it, refine it and interpret it too’ (Hargreaves, 1992, p. ix). However, as discussed previously, external factors also impact what teachers do and can do in the classroom.

Teacher knowledge and critical thinking: gaps in knowledge

Research on teacher knowledge is dominated by studies of beginning and expert teachers that focus on concepts such as PCK and craft knowledge in literacy and Science subjects (Munby, Russell, & Martin, 2001). However, there is surprisingly little research on critical thinking conducted from the perspective of teacher knowledge. There has been much discourse on the merits of critical thinking in education (e.g. Paul, 1995; Scheffler, 1989; Halpern, 2003; Lipman, 2006) and the various approaches to teaching it in the literature (e.g. Beyer, 1997; Costa, 2001a, 2001b; Lipman, 1985; Ritchhart, 2002; Tishman, Jay & Perkins, 1995), but there is a dearth of research that examines teacher knowledge in the context of critical thinking (e.g. Gruberman, 2005; Nagappan, 1998; Zohar & Schwartz, 2005). To date, questions such as: ‘What are the implications of the objectives of thinking curricula on the nature of subject matter knowledge, pedagogical knowledge and PCK?’ or ‘What do teachers need to know to teach critical thinking or implement a critical thinking curriculum effectively?’ have yet to be fully examined. These issues were raised by Nickerson (1988) over thirty years ago when he wrote:

it is no more reasonable to expect an individual who does not know a lot about thinking to teach thinking effectively, than to expect one who does not know a lot about math, or physics, or literature to be
an effective teacher in any of these areas. In the long run, how successful institutionalized education will be in incorporating effective teaching of thinking in the typical classroom will depend to no small degree on how much emphasis teacher-training programs put on thinking in their curricula. (p. 6)

It is within the theme of teacher knowledge in critical thinking, that I begin the discussion of the analytical framework for the study of teacher knowledge and practice of critical thinking used in Zohar and Schwartz’s (2005) study.

Towards the conceptualisation of a teacher knowledge base in the context of teaching thinking

In the process of conceptualising a theoretical framework to understand what a teacher knowledge base might entail in a ‘thinking curriculum’ where the development of students’ critical thinking is one of its explicit goals, Zohar and Schwartz (2005) suggest that teachers need to know a variety of thinking patterns (or skills, or strategies) on a cognitive and metacognitive level. They also need to know how to:

- teach in a way that would engage students extensively in tasks that require higher-order thinking skills;
- implement a curriculum that focuses on higher-order thinking goals, and/or know how to design lessons that explicitly focus on such goals;
- identify students’ weaknesses in reasoning and develop successful strategies to address them;
- replace their traditional assessment practices with reformed ones that match their new teaching goals; and
- engage their students in the ‘language of thinking’, in metacognitive thinking, in transfer of thinking skills across various subjects, and in cultivating thinking dispositions. (pp. 1597-1598)

In delineating these requirements, Zohar and Schwartz (2005) suggest the need for a special knowledge base that teachers who teach thinking (or are expected to do so) require — a teacher knowledge base that requires more
than PCK. In their study of teacher knowledge in the context of teaching higher-order thinking, Zohar and Schwartz (2005) found the original constructs associated with PCK to be unsuitable. They found the distinctions among the concepts, subject matter knowledge (SMK), or content knowledge (CK), pedagogical knowledge (PK) and PCK to be 'fuzzy' and limited as a theoretical framework.

The notion of SMK is perceived to have 'drawbacks' as a concept in the study of teachers' practice of higher-order thinking. Zohar and Schwartz (2005), for instance, claim that subject based programmes or curriculum, do not explicitly emphasize knowledge on thinking processes. Furthermore, they suggest that an important missing component from traditional definitions of SMK is the 'metacognitive knowledge of thinking skills' (p. 1598). Given that traditional conceptions of SMK do not necessarily incorporate critical thinking as an integral dimension, I agree with this position.

Zohar and Schwartz (2005) also found PCK, which they saw as the conflation of pedagogy and specific subject matter knowledge, 'inappropriate' as a framework to study teacher knowledge in their context of higher-order thinking. They argue that their study of teachers' understanding of higher-order thinking relates to the 'general aspects of thinking rather than to a specific subject-matter'.

In addition, Zohar and Schwartz (2005) found the concept of PK as inadequate for their study. This is because PK refers to generic teaching strategies, which can include questioning techniques and, thus, does not effectively capture an important dimension. That is, the 'detailed, rich and specific knowledge that is required for successful implementation of a project (or curriculum) whose explicit goal is to foster students' thinking' (p. 1598).

In part, drawing on the PK concept is also made difficult due to the 'specialist-generalist' (Davies, 2006) debate in teaching critical thinking discussed previously. According to Zohar and Schwartz (2005), an infusion approach to thinking instruction is premised by the notion that thinking skills have some elements which are general and some that are content specific. As such,
reference to teacher knowledge of thinking as being either PCK or PK would be problematic in their view.

Thus, in finding an appropriate construct for the purpose of their study in the context of higher-order thinking, Zohar and Schwartz (2005) reconceptualised the notion of teacher knowledge as ‘pedagogical knowledge in the context of teaching higher-order thinking’ (p.1598). They assert that this is because the concept highlights the ‘fact that pedagogical knowledge in this field has unique characteristics [and it] does not imply a commitment to treat this knowledge as either content specific or general’ (p. 1599). Their reconceptualisation also implies that contemporary conceptualisations of teacher knowledge in the PCK framework are insufficient to function as an effective theoretical framework in the understanding of teacher knowledge in a curriculum that explicitly aims to develop students’ thinking.

Pedagogical knowledge in the context of teaching higher-order thinking (PKHOT) embodies the novel concept of teacher knowledge in teaching thinking. Yet, PKHOT does not serve as a holistic analytical framework to examine the domains of SMK, PK and PCK in the context of teaching thinking in which these domains need to be conceived as interacting dynamically. The PKHOT concept is limited by the fact that it neither encompasses the interactions and tensions among these domains, nor illustrates the complex relationships that exist among them as teacher knowledge (Abell, 2008; Loughran, Berry & Mulhall, 2006; Nilsson, 2008). In this light, it can be argued that PKHOT is a rather monolithic concept to capture the complexities and dynamics of the teacher knowledge base in the context of teaching thinking.

Contrary to Zohar and Schwartz (2005), I suggest that it is PCK’s notion of a teacher knowledge base comprising various domains (Abell, 2008; Grossman, 1990; Shulman, 1986, 1987; Nilsson, 2008) that is constructive in revising the concept of a teacher knowledge base in the study of teachers’ knowledge and practice of critical thinking. I argue that focusing on PKHOT without taking into account how the other knowledge domains of SMK, PK and PCK impact and/or interact with it, effectively marginalises the dynamics among these other knowledge domains and ignores the inherent complexities.
In this regard, Zohar (2004) in her study acknowledges that PKHOT does not sufficiently attend to the notion of subject matter, which Shulman (1987) cautions is the 'missing paradigm' in the research on teacher knowledge.

As the literature suggests, the complexities of teacher knowledge (Fang, 1996; Kagan, 1992; Munby et al., 2001) imply that the knowledge domains — SMK, PK and PCK — are often interlinked and cannot always be distinctly teased out in practice or easily articulated, as was found to be the case during the data analyses (see Chapter 4). Thus in contrast to Zohar and Schwartz's (2005) position, I suggest that the PCK framework provides the theoretical basis of understanding teacher knowledge as constituting various domains that in practice have complex interactions.

However, to better understand and conceptualise teacher knowledge and practice of critical thinking, the PCK framework may ultimately need to incorporate other knowledge domains. Based on what Nickerson, (1988), Beyer (1997) and Zohar and Schwartz suggest, this could possibly comprise the declarative, procedural and conditional knowledge domains of critical thinking or what can be referred to as critical thinking pedagogical content knowledge (CTPCK) base or a knowledge base of critical thinking. This concept might be able to capture the complexities of not only teaching, but teaching in a context in which the emphasis on critical thinking is an explicit reform aim. Thus, as the study will illustrate, an emergent framework of teacher knowledge that incorporates these domains in the context of critical thinking could offer a more complete heuristic tool (Putnam & Borko, 1997) which could help understand the complex and interwoven relationships as found in the study.

Summary

Part IV of the chapter addresses the under-researched field of teacher knowledge and critical thinking. In doing so, it:

- reviewed the key literature on the combined areas of teacher knowledge and critical thinking and identified gaps in this field;
• illustrated how previous research in the area situates the present study; and

• argued the concepts of PCK and pedagogical knowledge in the context of higher-order thinking in the literature are inadequate constructs to articulate the teacher knowledge base in the study of teachers' knowledge and practices of critical thinking; and

• suggested that an emergent framework comprising PCK and the knowledge base of critical thinking could be a more holistic framework to understand the teacher knowledge base in the context of teaching thinking.

Figure 2 summarises the different areas discussed in the various sections of Chapter 2 and illustrates how each area contributes to the framework that informs this study. With the research context now framed, the next chapter offers the explication and justification for the choice of research methodology and methods and the design of the study.
Figure 2: Summary of the key areas framing the study

**Teacher knowledge:**
- Pedagogical Content Knowledge
- Teacher knowledge & beliefs vs. teacher actions & students' perceptions
- Clark & Peterson's (1990) model of teacher thought & action

**Critical thinking & teacher knowledge:**
- Gaps in the field
- Importance of teacher knowledge in teaching thinking
- Situational factors impact teacher knowledge & practice of thinking

**Critical thinking:**
- Its importance
- Definitions/theories
- A revised expansive conception
- Teaching approaches, strategies & pivotal elements

**Singaporean education:**
- Educational context & developments
- Underlying philosophies & tenets
- 'Thinking Schools, Learning Nation'
- The critical thinking policy thrust

**'Critical Thinking Pedagogical Content Knowledge' framework:**
- The teacher knowledge base of critical thinking (declarative, procedural & conditional knowledge) needed in implementing critical thinking or the 'thinking curriculum'
- Impacts knowledge and practice of critical thinking

**Understanding teacher knowledge & practice & students' perceptions of critical thinking within TSLN**
CHAPTER 3

ARTICULATING THE STUDY'S METHODOLOGY AND METHODS

Introduction

Chapter 1 discussed the research background and significance, and introduced the research questions:

1. What are teachers’ perceptions and knowledge base of critical thinking?
2. How and to what extent do teachers implement critical thinking in their classroom?
3. What are students’ perceptions of critical thinking?

Chapter 2 established the research context, connecting literature on Singaporean education, critical thinking and teacher knowledge that collectively form the key areas framing this study.

In Chapter 3, I discuss the paradigm and research methodology that frame my approach to the study. I also present the rationale for the research design and conclude the chapter with a discussion of the criteria and the strategies used to authenticate and establish the study’s quality.

The interpretive constructivist paradigm: an introduction

LeCompte and Schensul (1999) write that a ‘paradigm constitutes a way of looking at the world; interpreting what is seen; and deciding which of the things seen by researchers are real, valid, and important to document’ (p. 41). Given the nature of my research aims and questions, it is the qualitative research paradigm that informs the study.

The qualitative paradigm is essentially premised on the notion that meaning is socially constructed by individuals upon their interaction with the world (Lincoln & Guba, 2005). Qualitative research is driven by the interest in and the importance of understanding people’s constructions, interpretations and experiences of their world (Charmaz, 2000; Merriam, 2009; Rubin & Rubin,
2005; Patton, 2002) in contexts which are 'not static' (Yates, 2004). This is also where education is viewed as an experience that is lived (Freebody, 2003; Merriam, 1998, 2009). In contrast, positivist or quantitative paradigms are predicated by the ontology that education is an object to be studied in which reality is perceived to be stable and the knowledge gained is quantifiable and objective (Merriam, 2009; Patton, 2002). Given these diametrical ontological tenets, it is the qualitative methodology which provides the overarching paradigmatic 'fit' to the research aim of the study — the pursuit of in-depth understanding of participants' meanings and experiences of critical thinking under the TSLN policy.

More specifically, the research paradigm adopted can be described as 'interpretive constructivist'; one in which 'the goal of research is learning about contingent truth, truth that seems to hold at a particular time under specified circumstances' (Rubin & Rubin, 2005, p. 24). Therefore, as a constructivist, I see that the elicitation of research participants' 'empirical worlds' (Charmaz, 2000) is crucial and that 'understanding the meaning of the process or experience constitutes the knowledge to be gained from an inductive, hypothesis- or theory-generating (rather than a deductive or testing) mode of inquiry' (Merriam, 1998, p. 4).

Furthermore, contrary to positivistic paradigms, constructivists search for specifics to construct an understanding based on them (Rubin & Rubin, 2005, p. 28), rather than focusing on the average and ignoring specifics. Thus, this study is also about the pursuit of insights into the 'webs and patterns of influence' (Lincoln, 1995, p. 92) that work on individuals.

Hence, it was also important that I established and maintained a sense of coherence, consistency and unity throughout my study. In this regard, the notion of 'methodological congruence' (Morse & Richards, 2002) in which 'the purposes, questions, and methods of research are all interconnected and interrelated so that the study appears as a cohesive whole rather than as fragmented, isolated parts' (Creswell, 2007, p. 42) was instrumental. This is the thread that I have consciously attempted to weave through the different parts of my research to achieve a salient sense of unity and consistency.
Research design

Yin (2003) suggests that a research design is ‘a logical plan for getting from here to there, where here may be defined as the initial set of questions to be answered and there is some set of conclusions (answers) about these questions’ (p. 20; emphasis in original). Within the interpretive constructivist framework that informed my investigation into teachers’ and students’ perceptions and experiences with critical thinking, the qualitative case study approach is viewed as the appropriate ‘logical plan’ to address my research questions.

Merriam (1998, 2009) highlights the popularity and usefulness of the qualitative case study as an approach in educational research. Previous studies on PCK (e.g. Grossman, 1990) and teacher knowledge and critical thinking (e.g. Gruberman, 2005) discussed earlier illustrate how the qualitative case study design can contribute to understandings in educational or classroom research. This is where education, which is also seen as a ‘process’, justifies a research design that is ‘process-oriented, flexible and adaptable to changing circumstances and a dynamic context’ (Anderson and Arsenault, 1998, p. 152).

Case study definitions, however, are found to differ in some respects in the literature. Yin (2003) defines a case study as ‘an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident’ (p. 13). In contrast, Merriam (1998, 2009) suggests that a qualitative case study design is used to yield an in-depth understanding of the situation and meaning for those involved where the focus is ‘in the process rather than outcomes, in context rather than specific variable, in discovery rather than confirmation’ (p. 19). On a similar note, Stake (1995) states that case study is ‘the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances’ (p. xi). It is on this note of ‘particularity’ that the qualitative case study design is seen as highly appropriate to educational research where the conditions in which teachers work are often idiosyncratic and context bound.
In addition, Yin (2003) suggests that a case study is useful in relation to a study 'about a contemporary set of events over which the investigator has little or no control' (p. 9). Therefore, in the context of research questions that aim to get a deep understanding of the issues pertaining to critical thinking from teachers' and students' perspectives, the qualitative case study approach is considered fitting for this research.

Moreover, in light of these case study definitions, I see qualitative case studies as involving the pursuit of understanding of the subjects of the study in their existing context with its attendant dynamic circumstances. This entails the investigation of a world in a constant state of flux and constructing an understanding of it and its agents from the perspectives of teachers and students. Concomitantly, this demands that I reconcile with the issue that the teachers and students who are the case and the 'unit of analysis' (Merriam, 1998, 2009) are 'not static' (Yates, 2004). They cannot be frozen and controlled neither in time nor circumstances and thus, my exploration of such a world justified the employment of a qualitative case study design. This design provided a viable entry point to access and construct my understandings of teachers' and students' perceptions of and experiences with critical thinking, which are inextricably part of the dynamic educational context — a context in which I became inevitably enmeshed within the research process.

My case study of teachers' and students' perceptions of and experiences with critical thinking also required a design that provided me with a sense of depth and breadth in understanding the underlying issues. Stake (1995, 2000) describes three kinds of case studies — intrinsic, instrumental and collective. The focus of an intrinsic case study lies with that particular case and does not seek, by studying it, to learn about other cases or about some general issue. In contrast, an instrumental case study is where 'a particular case is examined mainly to provide insight into an issue or to redraw a generalization' (p. 437). A collective case study, which is a type of instrumental study, is where the objective lies in the pursuit of an understanding of an issue rather than a specific case. Thus, in this light,
teachers and their students were the cases and the means to understanding the issues of concern in the study.

My investigation of these issues involving teachers' perceptions, knowledge and enactment of critical thinking and their students' perceptions of critical thinking called for a collective case study or a multicase study approach, which is instrumental in nature. Referring to the advantage of the collective case study, Miles and Huberman (1994) state:

By looking at a range of similar and contrasting cases, we can understand a single case finding, grounding it by specifying how and where and, if possible, why it carries on as it does. We can strengthen the precision, the validity, and the stability of the findings. (p. 29)

Another strength the collective case study approach brought to my research is that data analysis involved a number of cases instead of just one case, thus, allowing me a more holistic understanding of the issues in focus. Furthermore, I viewed the case study design as a feasible approach, given the nature of my research. This is because, consistent with the study's overarching constructivist methodology and qualitative case study design, the 'goal will be to expand and generalize theories (analytic generalization) and not to enumerate frequencies (statistical generalizations)' (Yin, 2003, p. 10).

Research participants: teachers and students as key agents of education

Teachers have substantive impact on students — the consequential stakeholders (Groundwater-Smith, 2005) — and their school performance, (Darling-Hammond, 2000; Wenglinsky, 2000, 2002) and in the implementation of the curriculum (Fullan, 2001; Hargreaves, 1992). On the account of this, teachers and their students were the participants — the cases — in the study. Notably, my selection of them as participants is also consistent with calls to incorporate teacher voices and student voices in the discourse of education reforms and issues (e.g. Hargreaves, 1996; Lincoln, 1995; Rudduck, 2007; Rudduck & Flutter, 2000, 2006). In the Singaporean
context particularly, their selection is seen as providing the platform for their voices which are often ‘silenced and marginalised’ in Singaporean education (Liew, 2008) to be heard.

The participants came from government schools as these schools are the ones that are directly informed by ministerial policies and initiatives in Singapore and, by far, are the norm. For this reason, I considered teachers and students from government schools as best representing the typical Singaporean education system under the TSLN framework. In being so, they also provided a source for purposeful sampling (Patton, 2002) which is ‘based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned’ (Merriam, 1998, p. 61).

**Teachers**

With purposeful sampling in mind, my selection of teachers was based on four criteria. In the context and purpose of my study, the following four criteria were relevant:

1. The type of school — i.e. government (regulated by MOE as opposed to private schools which are not under their auspices);

2. The grade level of the teacher — i.e. primary, secondary or pre-university;

3. The teacher's subject(s)— i.e. English, Language Arts, or Humanities subjects;

4. The teaching experience — i.e. beginning teacher (1-3 years of trained teaching experience) or experienced teacher (5 years or more of trained teaching experience).

While I have explicated the first criterion, my rationale behind getting teachers from the different grade levels was to get a sense of breadth across the different levels of government schools that make up the educational system — the primary, secondary and pre-university or junior college level. Each of these schools represented the typical site of a primary, secondary and junior
college in the Singaporean educational context 'because it is not in any major way atypical, extreme, deviant, or intensely unusual' (Patton, 2002, p. 236). In addition, this criterion provided me with insights into whether the grade level has any bearing on teachers' perceptions, knowledge base and practices of critical thinking.

The third criterion is justified by my experience and belief that the Language Arts and Humanities subjects, generally, have more latitude towards the incorporation of critical thinking during teacher instruction. One reason for this is linked to the 'multilogical' (Paul, 1995) and more open nature of these subjects in the shape of their lack of 'well-defined correct outcomes' and 'models and explanation' (Black et al., 2004, p. 17) as opposed to subjects such as Mathematics and Science, which are in contrast 'monological' (Paul, 1995). This does not to mean that Mathematics and Science are impervious to the incorporation of critical thinking — far from it. Rather, relative to the Language Arts and Humanities subjects, for example, they often present fewer opportunities for students to engage and challenge mostly set 'outcomes' and 'models' in the subject matter, given their largely 'monological' nature. Moreover, my previous teaching experience and familiarity in the Language Arts subject areas assisted in my understanding of certain aspects of the case studies, factors that are vital in qualitative studies (Stake, 1995).

Informed by the notion of pedagogical content knowledge (Abell, 2008; Nilsson, 2008; Grossman, 1990; Shulman, 1986, 1987) and in light of research that suggests differences between beginning and experienced teachers, as discussed in Chapter 2, the final criterion of teaching experience was to understand if teaching experience does influence or impact the teacher knowledge base and practice of critical thinking in the implementation of TSLN. Thus, based on the above criteria and given my emphasis on in-depth understanding of 'information-rich cases' — these being considered cases 'from which one can learn about issues of central importance to the purpose of research' (Patton, 2002, p.46) — I selected six teachers.
Two teachers from a primary school, a secondary school and a junior college together with a class of their students participated in the study. Following the criteria outlined, the two teachers who participated from each of the schools comprised an experienced teacher with more than five years of trained teaching experience and a beginning teacher with three years or less of trained teaching experience. All the teachers in the study taught English, Language Arts or Humanities subjects except the primary school teachers. Being generalists, the primary school teachers also taught Mathematics and Science. All but one participant (Sean) taught at the grade level (i.e. primary, secondary or junior college) for the length of their service. Table 3 provides summary information about the teacher participants.

**Table 3: Summary information of teacher participants**

<table>
<thead>
<tr>
<th>Teacher participant</th>
<th>Qualifications</th>
<th>Experience</th>
<th>Grade level</th>
<th>Subjects taught</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sean</td>
<td>PGDE, BA</td>
<td>10 years</td>
<td>junior college</td>
<td>Literature</td>
</tr>
<tr>
<td>Evelyn</td>
<td>PGDE, BA</td>
<td>2 and a half years</td>
<td>junior college</td>
<td>General Paper</td>
</tr>
<tr>
<td>Nathan</td>
<td>PGDE, BA</td>
<td>10 years</td>
<td>secondary</td>
<td>English</td>
</tr>
<tr>
<td>Yvonne</td>
<td>PGDE, BA</td>
<td>8 months</td>
<td>secondary</td>
<td>English</td>
</tr>
<tr>
<td>Roy</td>
<td>DipEd</td>
<td>11 years</td>
<td>primary</td>
<td>Generalist</td>
</tr>
<tr>
<td>Ivan</td>
<td>PGDE, BA</td>
<td>2 years</td>
<td>primary</td>
<td>Generalist</td>
</tr>
</tbody>
</table>

Note: PGDE refers to Post Graduate Diploma in Education, BA refers to Bachelor's degree and DipEd refers to Diploma in Education

**Students**

Apart from the students in the regular class who were involved in the lesson observations, a group of six students was selected by each teacher for the student focus groups. From the research standpoint, getting an understanding of students' perspectives, alongside that of teachers', was essential in yielding a more holistic understanding of the research issues. This is especially so when the incorporation of student voices is argued to be increasingly key in the discourse of educational reform (Lincoln, 1995; Rudduck, 1996, 2007; Rudduck & Flutter, 2004).
Student participants for the focus group were primarily selected by teachers themselves. In assisting with their selection, I communicated to teachers that the group basically be a 'representative cross-section' of the students in their class. I also requested that teachers' selection take into account the gender and ethnic balance and range of student abilities that reflected the 'typical class' as well as the group dynamics to make for a constructive focus group session.

<table>
<thead>
<tr>
<th>Student Focus group (6 students per group)</th>
<th>Age</th>
<th>Gender</th>
<th>Ethnic group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary school Roy's group</td>
<td>11 to 12</td>
<td>3 males, 3 females</td>
<td>5 Chinese, 1 Malay</td>
</tr>
<tr>
<td>Primary school Ivan's group</td>
<td>11 to 12</td>
<td>4 males, 2 females</td>
<td>5 Chinese, 1 Indian</td>
</tr>
<tr>
<td>Secondary school Nathan's group</td>
<td>12 to 13</td>
<td>3 males, 3 females</td>
<td>6 Chinese</td>
</tr>
<tr>
<td>Secondary school Yvonne's group</td>
<td>16 to 17</td>
<td>3 males, 3 females</td>
<td>5 Chinese, 1 Malay</td>
</tr>
<tr>
<td>Junior college Sean's group</td>
<td>17 to 18</td>
<td>2 males, 4 females</td>
<td>5 Chinese, 1 Indian</td>
</tr>
<tr>
<td>Junior college Evelyn’s group</td>
<td>17 to 18</td>
<td>2 males, 4 females</td>
<td>5 Chinese, 1 Indian</td>
</tr>
</tbody>
</table>

My rationale behind teacher selection of student participants was to achieve a more balanced and accurate representation of the student cohort. Having been a classroom teacher, I recognised that teachers know their own students and class the best especially when teachers' PCK also involves knowledge of their students (Abell, 2008; Nilsson, 2008). Furthermore, leaving teachers with the selection of students gave them a sense of trust and inclusion in the research process, rather than a feeling of intrusion and exclusion. Within the interpretive paradigm, this helped the interactive relationship between the participants and the researcher. Table 4 provides summary information on the student focus group participants, as selected by the teachers in the study. Students' age range and ethnic make-up are

106
broadly representative of the age and ethnic groups that are found in each class. However, it is also not unusual in the Singaporean educational context to find classes in typical government schools made up entirely of Chinese students given that they are the overwhelming ethnic majority in the country.

**Adhering to research ethics**

I approached possible teacher participants four months prior to the study. While I had broached the idea of participating with a number of teachers who fitted the selection criteria, six teachers finally agreed to be part of my research. In keeping with the University of Melbourne’s ethics guidelines, a plain language statement (see Appendix 1 and 2) that provided the overview of the study and its aims was forwarded to teacher and student participants. Both the University of Melbourne’s Human Research Ethics Committee and Singapore’s Ministry of Education (MOE) granted approval to conduct research in the schools, pending the subsequent consent from the school principals as the school ‘gatekeepers’.

**Research sites**

Chapter 2 provided the larger Singaporean educational context and in this section, I present the descriptions of the three government schools in Singapore — the research sites — by presenting a ‘sketch’ of each of them. The three schools in the study consisted of a primary school, a secondary school and a junior college; they were all co-educational schools. Like many government schools across Singapore, the school population consisted of the main ethnic groups found in the country — the majority Chinese and the minority Malay and Indian groups and other ethnic groups.

As stated previously, these schools were seen as the ‘typical site’ because they were ‘not in any major way atypical, extreme, deviant, or intensely unusual’ (Patton, 2002, p. 236). And as schools ‘located in heartlands of public housing estates and generally serving children from working class catchment areas’ (Gopinathan, 1999, p. 109), they can be categorised as ‘neighbourhood schools’, which are the norm in Singapore.
The primary school

The primary school is located in northern Singapore deep in the heart of a public housing estate, which is the typical residence of more than 80 percent of Singaporeans. Upon my first visit to the school, the Chinese characters that were embossed on the bold red arched portal of the school façade immediately told of its early Chinese heritage. It was founded by a Chinese clan association in the 1910s and developed over the decades to become 'a full government aided school' in 1957, moving to its current premises in 1985 to cater for the growing student population.

The school had a student population of over 2000 students. With specific student socio-economic details being unavailable, I was led to understand that it mainly consisted of children of middle class families with smaller sections from the lower and upper classes. During my 'guided tour' around the school compounds on my first visit, I saw that the student population included new migrants and locals. Like all government primary schools in the Singaporean educational system, the school prepares students for the local major examination, the Primary Standard Leaving Examination (PSLE). The PSLE is the national placement examination for entrance to secondary education (see The Singapore Education Landscape in Appendix 4 for a graphic overview of the educational system).

The school also had a staff of over 90 teachers who teach a number of examinable subjects: English, Science, Mathematics and Mother Tongue (ML) languages, which are Mandarin, Malay or Tamil. Under Singapore's bilingual educational policy, students, depending on their cultural and racial background, are required take one of these ML languages as a second language. Non-examinable subjects taught in the school include Health and Physical Education and Social Studies.

The school's stated 'vision' is to develop its students into 'a community of thinkers who are patriotic, gracious and global in outlook'; its 'mission' is in its commitment in 'developing its students in five core areas: moral, intellectual, physical, social and aesthetic, and 'preparing them for the 21st century'.
In addition, the school’s core values are captured in the acronym ‘G-R-A-C-I-O-U-S-L-Y’. These were defined by the school as: ‘Gracious’, ‘Respectful’, ‘Achieving’, ‘Caring’, ‘Innovative’, ‘Observant’, ‘United’, ‘Sincere’, ‘Loyal’ and ‘Youthful’. Interestingly, the classes at the various grade levels are also named after each of the values. On the school website, the principal describes the school as ‘a premier school that is held in high esteem by parents and members of our community’ and one that is ‘focusing on the quality of teaching and learning of our staff and students’ and ‘embarking on a series of reviews to make our lessons more engaging’. He also saw the organizational and ministerial awards that had been won by the school, the People Developer Standard (PDS) and Outstanding Development Award for National Education respectively, as ‘validations that our school has set up sound systems and processes that support our core business of educating our young’.

The PDS is awarded by SPRING Singapore — the agency for enterprise development in Singapore that aims to grow competitive and innovative enterprises. It provides certification for the business excellence niche standard for people. Such business awards that schools strive to achieve characterise the growing marketisation and corporatisation of Singaporean schools (Gopinathan, 2001; Tan, 2007). The outstanding award for National Education is part of MOE’s Masterplan of Awards (MoA) within the School Excellence Model (SEM) (see pp. 28-29 for the earlier explication of SEM and MOE’s MoA).

The secondary school

The secondary school is located at the heart of a public housing estate, serving mostly students living in the surrounding neighbourhoods. First founded in 1892, it had a student enrolment of about 1550 students. In my numerous visits and conversations with the teacher participants, it was clear that the school comprised a Chinese majority with a very small minority of Malay students. Students mostly comprised children from the middle-class families with smaller groups from the lower-class and upper class families. The school had a staff of about 80 teachers who teach English Language,
Mother Tongue languages, Mathematics and Science, and prepare students for the Singapore-Cambridge (GCE) Normal (N) and Ordinary (O) level Examinations.

The GCE O and N levels are national examinations, which the students sit for towards at the end of their secondary education. While the subjects and examination syllabus are determined by MOE through the Singapore Examinations and Assessments Board, the University of Cambridge Local Examinations Syndicate is tasked to formulate the examination questions. However, it must be noted that students in some other secondary schools under new MOE programmes, such as the Integrated Programme and the Elective Programmes, do not sit for this examination. Instead, students in these high-achieving schools take the GCE Advanced (A) level examination for entry to university when aged about 18 years old, or alternative examinations such as the International Baccalaureate (MOE, 2006).

Being a government school with strong Christian traditions, the school mission claims ‘to nurture students into highly principled and truthful adults with a Christian sense of right and wrong; useful citizens capable of committing themselves to God and the society in which they live’. Echoing the mission is the school vision of developing ‘morally upright individuals with a passion to learn and a commitment to serve’. This is also embossed on the school building, as a reminder to students, staff and visitors alike.

The school won a number of organizational and ministerial awards that illustrate its achievements as an organization and an educational institution. As a source of pride and achievement, the awards attained include the People Developer Standard, the Sustained Achievement Award and the Development Award (see pp. 28-29 for the explication of SEM and MOE’s MoA).

**The junior college**

The junior college was my place of work when I was a teacher in Singapore. While returning to the college was an opportunity to reacquaint myself with former colleagues, the research site also provided a familiar context. To
some in my former department and college, I was the researcher with a familiar face, but to others I was a just the 'researcher'.

The college had a student population of about 1750 students and a staff of about 140 teachers. Students comprised largely Chinese students with a minority of Malay and Indian students. The students mostly came from middle class families with smaller segments of the population from the upper and lower classes, which is common in most 'neighbourhood schools'. However, among its student population was a group of 'overseas scholars'. They were mainly students from Asian countries such as India, China and Malaysia who have excelled in the secondary level examinations in their native countries. The college sees them as 'enriching' the local student population as most of them often excel in the examinations and in the other curriculum areas, thereby providing healthy competition.

Established in 1984 in the heartlands of a public housing estate in northern Singapore, the college serves the surrounding neighbourhoods. Like all other junior colleges, it prepares students for the General Cambridge Advanced (GCE 'A') Level Examination. The college sees its vision as creating 'a vibrant and collaborative learning community where caring leaders are groomed to be best for the world' and its mission was to nurture its students 'to be morally upright, resilient and caring leaders with the passion to seek knowledge and the drive to excel'. These mission and vision statements are also restated on the walls of the school foyer where they seem to be proudly displayed.

The college values include 'Integrity', 'Commitment', 'Learning', 'Social conscience' and 'Synergy'. The college encourages students and teachers to learn and grow together and form

a community of active life-long learners who demonstrate a strong passion for knowledge, imbued with a strong sense of compassion and social conscience ... [and] ... are groomed to be leaders who strive with enthusiasm to serve a globally-oriented community and nation.
The college also has 'strategic thrusts', or organizational aims, in place. Having worked in the college, these are the core pursuits that help the college strategize itself in attaining organizational excellence. These include, among others, striving towards students 'academic excellence' and 'character development'. Indicating its excellence as an organization and an educational institution, the college has won organizational awards such as People Developer (PD) and Singapore Quality Class (SQC) and Sustained Achievement Awards and Best Practice Awards. Like the PD award, the SQC, which is the certification for the overall business excellence of an organization, illustrates as mentioned, the increasing elements of marketisation and corporatization of Singaporean education (Gopinathan, 2001; Tan, 2007). The logos of these awards attained are embossed on the college's cream, blue and yellow façade; they not only are sources of collegial pride, but also public displays of its standing as an educational institution of growing repute.

'Insider' status and entry

I assumed the position of an informed participant — as a Singaporean and a teacher — and this status provided me with a further sense of context familiarity, that of an insider. While potential bias was an issue that I had to negotiate, this nonetheless was fundamental in framing my larger understanding of the dynamics of Singaporean classrooms, teacher and student narratives, and official documents. Such familiarity also meant that I could be more cognizant of the implicit subtleties and nuances inherent in the context of the research sites.

Assuming the position of an insider in one school and that of a trusted contact of teacher insiders in the other two schools allowed the teacher participants to feel more comfortable and secure in sharing their thoughts in interviews and in allowing my presence in their classrooms. Mindful of how teachers can be suspicious of external research conducted in their schools, my insider status thus minimised such anxieties associated with more formal settings and provided for a less inhibitive research context both in interviews and classroom observations (Gruberman, 2005).
Although being an insider may raise issues of subjectivity and bias in research (Patton, 2002), it was precisely such familiarity with the participants that helped in my study. It paved the way for acceptance and access to the school and classrooms, and encouraged teachers to be less inhibited and more candid in their interviews. The establishment of rapport with participants was also key (Bogdan & Biklen, 1998; Merriam, 1998, 2009) because it allowed the research to gather meaningful data, creating the cordial context that allowed such data to emanate.

**Data gathering**

Consistent with the qualitative case study design, data were gathered from multiple data sources, (Merriam, 1998, 2009; Patton, 2002; Yin, 2003, 2009). In addressing the various research questions in the study, I conducted interviews with teachers and their students, conducted lesson observations in the three schools, and obtained students’ work samples as part of documentary analysis. Figure 3 presents the overview of the data gathering process.

**Interviews**

Interviews are seen as the primary source of data in qualitative research (Merriam, 1998, 2009), especially in the understanding of perceptions (Mason, 2002), and one of the most important in qualitative case studies (Merriam, 1998, 2009; Yin, 2003, 2009). In qualitative case studies, interviews aim to discover what transpired and the reasons and meanings behind it (Rubin & Rubin, 2005). Stake (1995) also points out that in the task of qualitative researchers discovering and portraying multiple views of the case, ‘the interview is the main road to multiple realities’ (p. 64). Thus, given the aim of eliciting teachers’ and students’ perceptions of and experiences with critical thinking in the research, the interview was an essential tool that provided me with the means to access and retell participants' perspectives in the study.
Figure 3: Overview of data gathering and frequency

Teacher semi-structured interviews
The in-depth interview conducted with the teachers was primarily aimed at eliciting their conceptual and pedagogical understandings of critical thinking — the ways in which they have come to construct their knowledge base and the extent to which they implemented critical thinking in the classroom. It was intended to seek ‘the same deep level of knowledge and understanding as the members or participants’ (Johnson, 2002, p. 106). Crucially, the in-depth interviews were also seen as ‘extensions of ordinary conversations’ where the interviewees are partners of the research enterprise rather than subjects to be tested or examined’ (Rubin & Rubin, 2005, p. 12).

The semi-structured interview format provided me with the delicate balance between the goals of hearing the informants’ views on the issues I had identified and being able to provide the flexibility for both the interviewees and me, the interviewer, to extend and improvise questions during the interviews (Arksey & Knight, 1999). Consistent with my interpretive constructivist stance,
this format appropriately situated the interview participants as active constructors of meaning and not passive mediums for collecting information from an existing body of answers (Holstein & Gubrium, 2003). As an active process in which questioning techniques mirror the individuality of the researcher and the contrasting relationships between researcher and interviewee (Rubin & Rubin, 2005), qualitative interviewing is therefore sensitive to the changing dynamics of the emergent nature of my study.

In the interviews conducted, I not only sought teachers' understandings of and experiences with critical thinking, but also their general beliefs on teaching and learning. Teachers' beliefs about teaching and learning underpin their professional practice and, thus, access to the latter was vital in the provision of teacher narratives (Fang, 1996; Gruberman, 2005; Kagan, 1990) of themselves as educators and how they situated themselves in the profession. In addition, understanding teachers' beliefs provided the starting point to access the teachers' perceptions and knowledge base of critical thinking and their practice of it in the classroom. Thus, the aim of such qualitative interviewing was:

- a solid, deep understanding of what is being studied, rather than breadth. Depth is achieved by going after context; dealing with the complexity of multiple, overlapping, and sometimes conflicting themes; and paying attention to the specifics of meanings, situations, and history. (Rubin & Rubin, 2005, p. 35)

This aim meant that apart from scheduled questions (see Appendix 3) on the research issues, which were informed beforehand, I also used the semi-structured interviews to further probe pertinent issues as raised by some teachers. This allowed me to get a deeper understanding of the context as well as other issues which they saw as significant and pertinent with regard to sharing their perceptions of and experiences with critical thinking.

In ensuring that the interview schedule addressed the research aims, it was first piloted with three teachers who were not involved in the study prior to the commencement of research. The pilot interviews allowed me to sharpen and revise the schedule accordingly, enhancing the subsequent questions and
interview process. Within the in-depth interview schedule, I intended to tease out teachers' understandings of critical thinking and their assessment of their knowledge base of critical thinking. This also included the ways in which they have acquired their knowledge and their recommendations on how it could further be enhanced from the various levels — that is, at the level of teacher education, professional development and school or ministerial policies.

I also aimed for the interviews to allow the teachers to articulate the extent and the manner to which they enacted critical thinking in the classroom and the factors they perceived which have hindered and encouraged their enactment. I elicited teachers’ suggestions on ways in which they could be supported and encouraged in the incorporation of critical thinking in their classrooms. Teachers' perspectives on how their knowledge base of critical thinking influenced their incorporation of critical thinking in their regular teaching were also elicited.

With time constraints placed on all teacher participants in their hectic schedules, an in-person in-depth interview was conducted with each teacher. Depending on what teachers raised and what were in turn probed deeper, the length of interviews varied — from about forty minutes to an hour — in which the focus of each interview was on active listening and on probing deeper, where appropriate. The interviews were audio-taped for subsequent transcription and held in a meeting room in the respective schools during a period when teachers were available.

To achieve an adequate depth of understanding of participants' experiences and understandings, in-person interviews were further augmented by subsequent email and on-line interviews (Couper & Hansen, 2002). These were a means of ensuring that the richness of the interview as one of the key data sources was not compromised in any meaningful way by time constraints experienced by some teachers. Email and on-line interviews thus provided opportunities for follow-up questions to be asked and the relevant clarifications made. Given the geographical constraints, I saw these as a viable option of 'tying up loose ends'. Given the qualitative methodology that frames the study, it is ultimately the quality — in terms of yielding depth of
understanding in the study — and not necessarily the quantity of data that mattered in the pursuit of participants’ perspectives in the qualitative case study (Merriam, 1998, 2009; Patton, 2002; Rubin & Rubin, 2005).

Student group interviews

Student participants, unlike the teacher participants, were interviewed in a group. Group interviewing is more naturalistic than survey interviewing (Lincoln & Guba, 1985) and it is ‘a research technique that collects data through a group interaction on a topic determined by the researcher’ (Morgan, 1996, p. 130), providing flexibility.

The decision to opt for group interviewing was also based on a number of other considerations. Group interviewing allowed more than one student to share their thoughts. Importantly, as ‘group interviews grow directly out of peer culture’, they thereby provided the space for ‘children [to] construct their meanings with their peers’ (Eder & Fingerson, 2002, p. 183).

In addition, group interviewing harnessed the existent group dynamics in which students felt more at ease in the presence of their peers. To some extent, this mitigated researcher effect as opting for a one-to-one interview with students would have potentially inhibited their responses. Thus, in this context attempting to elicit student responses through an in-depth interview would have been more of a hindrance rather than a help.

There was also a more practical consideration involved which pertained to the available time and logistics needed. As opposed to in-depth interviewing each student, conducting a group interview was the most time effective way to get a sense of students’ voices across the cohort at one time and place. Therefore, this, together with its merits discussed, made group interviewing the best means to interview students. The group interviews were held in designated meeting rooms in the respective schools and lasted from 40 to 60 minutes. To put students at ease and acquaint myself to them, each group interview began with simple ice-breaker routines. This included introducing myself and the study to students, explaining their key role in it, and getting them to share their names and their favourite subjects and activities in school.
With the group interview (see interview schedule in Appendix 3), I aimed at eliciting students’ perceptions of critical thinking in their learning and the extent to which their schooling system has developed their capacity to think critically. In addition, I elicited students’ perceptions of themselves as ‘thinking learners’ and sought what students thought would help foster and develop their critical thinking as aspired in TSLN. Given these aims, data from secondary and pre-university focus groups subsequently became the source of understanding students’ perspective of critical thinking. This is because having undergone more than six years of education and the entire primary school phase under the TSLN vision, only post primary students had the benefit of hindsight and previous schooling experiences to draw on during interviews. Thus, although the study began with interviewing students from all the three levels of education (i.e. primary, secondary and pre-university), given the emergent nature of the research, it became clear that data from student focus groups from the post primary levels offered the best data source to address the research question on students’ perceptions of critical thinking for the reasons explained.

In employing the interview as a research tool and one of the data sources in this study, I utilised the main strengths of the two types of interviews to suit the two groups of participants. In-depth interviews with teachers provided me with the deep knowledge and information of the ‘individual’s self, lived experiences, values and decisions, occupational knowledge, or perspective’ (Johnson, 2002, p. 104) in the privacy of one-to-one interviews. This was important as a means to allow teachers to articulate their varying perceptions, knowledge base and practices of critical thinking, allowing possible ‘multiple realities’ among teachers to emanate. Conversely, student focus groups harnessed the group dynamics of student interaction in which students felt more at ease in the presence of their peers and were less inhibited by my presence as an adult researcher. This was also seen as the context that maximised the opportunity for students to voice their perspectives on the issues discussed in interviews.
Classroom observations

Consistent with previous studies on teacher knowledge informed by the PCK framework (e.g. Nilsson, 2008; Rollnick et al., 2008), interviews were supported by lesson observations as part of the data gathering. In conjunction with interviewing and document analysis, observations were also a means of triangulating and substantiating findings (Merriam, 1998, 2009), providing for a deeper and holistic case understanding (Merriam, 1998; 2009; Stake, 1995).

In the context of the research questions, my primary aim for the observations was to focus on the ways and the extent to which critical thinking was enacted, incorporated and how elements of critical thinking were present or noticeable in the classroom. In this regard, a set of criteria for the classroom observations was developed based on the Criteria for Classroom Thoughtfulness designed by Onosko and Newman (1994) in their study of the incidence of higher-order thinking in the classroom and later adapted by Ritchhart (2002) in his book Intellectual Character.

Assuming the role of a non-participant or an on-lookey observer (Patton, 2002) in lessons, these criteria essentially provided me with a systematic reference point to systematically document the ways in which teachers implemented critical thinking in the classroom through observable actions such as questioning and seeking justification and explanation of student responses. They provided benchmarks to describe the extent to which the classrooms observed are ‘thoughtful classrooms’ (Beyer, 1997; Ritchhart, 2002; Ritchhart & Perkins, 2008) where the presence (or the lack thereof) of ‘observable qualities of classroom activity most likely to help students achieve depth of understanding, intellectual skills, and dispositions of thoughtfulness’ (Onosko & Newmann, 1994, p. 30) can be noted.

In addition, the criteria developed incorporated the elements of ‘classroom cultural forces’ — ‘those aspects of a classroom responsible for giving it its unique flavor and feel’ (Ritchhart, 2002, p. 146), delineated in Chapter 2. It is the nature of these cultural forces that largely influences the level of development and engagement of thinking in the classroom, or classroom
thoughtfulness (Beyer, 1997; Costa, 2008; Ritchhart, 2002; Ritchhart & Perkins, 2008; Onosko & Newmann, 1994). Thus, the overlaps and links justified the development of a revised set of criteria which combine the salient and common aspects of Onosko and Newmann’s (1994) *Criteria for Classroom Thoughtfulness* and Ritchhart’s (2002) elements of classroom cultural forces. Table 5 outlines the combined criteria referred to as the *Criteria for Classroom Thoughtfulness and Cultural Forces*.

The observations made based on the criteria were documented as the researcher’s field notes, which were subsequently used as part of data analysis. In order to characterize the manner and extent to which critical thinking is implemented in the classroom, these data were used to construct the ‘vignettes of teachers’ practice’ in the analyses of the data and discussion of findings. As such, these vignettes represent critical incidents (Patton, 2002) that capture how teachers typically implement critical thinking in their normal lessons.

Depending on the way each teacher’s time-table was structured, I conducted three to five lesson observations per teacher. Given the need to explain my presence as a non-participant observer, I was formally introduced to each class at the beginning of the lesson as ‘a researcher who is going to observe our class for his PhD’. In other instances, I was also introduced as the ‘friend’ of the teacher. Being formally introduced also provided me with the opportunity to brief the students of my study and its aims. To some extent, this helped students to be sensitised to the unusual experience of being observed by a researcher and thus aided in lessening researcher effect.

Table 5: *Criteria for Classroom Thoughtfulness and Cultural Forces* — adapted from Onosko & Newmann (1994) & Ritchhart (2002)

<table>
<thead>
<tr>
<th>Routines and structures that guide the life of the classroom:</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the nature of the physical environment and artefacts present in the classroom that value and promote thinking?</td>
</tr>
<tr>
<td>What is the nature of questions raised and/or class tasks assigned (given the ability level and preparation of the students)?</td>
</tr>
<tr>
<td>Are students given an appropriate amount of wait time to think, that is, to prepare responses to questions and offered explanations and reasons for their conclusions?</td>
</tr>
</tbody>
</table>

120
Do students assume the roles of questioner and critic?

**The language that the teacher and students use and the conversations they engage in:**

What is the extent of the language of thinking used in classroom interactions? What is the extent of students' active participation in classroom activities and interactions (cues include: raising hands, attentiveness manifested by facial expression and body language, interruptions motivated by involvement, length of student responses)? Do students engage in thoughtful discourse/dialogue with each other and/or the teacher?

**How the teacher acts and what the teacher models for students:**

What are the expectations for students' thinking and learning that the teacher conveys? To what extent was the teacher a model of thoughtfulness (principal indications include: the teacher showing appreciation for students' ideas and appreciation for alternate approaches to answers if based on sound reasoning; the teacher explaining how he or she thought through the problem; the teacher acknowledging difficulty of gaining a definitive understanding of the topic)? What is the nature of the teacher's pedagogical approach — dialogical and dialectic and student-centred or didactic and teacher-centred?

While I took every effort to minimise researcher effect, I was mindful that it cannot be totally avoided. Given that the interdependent relationship between the observer and the observed may precipitate changes in both quarters during observations, the key question, as Merriam (1998) points out, 'is not whether the process of observing affects what is observed but how the researcher can identify those effects and account for them in interpreting the data' (p. 103). In my subsequent data analyses, I was reflective of these effects.

**Documents**

Documents in the shape of students' work samples and official documents were part of the data. Together with interviews and observations they were
seen as a means of providing me with a more holistic analysis and understanding of the case studies (Merriam, 1998, 2009; Stake, 1995, 2006; Yin, 2003, 2009).

Depending on the grade level of the students, documents included class essay assignments and worksheets. Copies of students’ work were made and these were primarily used to understand the extent critical thinking was incorporated as part of students’ written work in class. For instance, questions and tasks found in the class work were looked at in terms of their aims and purpose and the extent and manner to which students’ critical thinking was sought in the completion of their work. Other documents used were official school and policy documents which provided me with the understanding of the larger context of curricular and school policies and expectations vis-à-vis the critical thinking policy thrust.

Data analysis

According to Patton (2002), ‘the case study approach to qualitative analysis constitutes a specific way of collecting, organizing, and analysing data’ and ‘well-constructed case studies are holistic and context sensitive’ (p. 447; emphasis in original). In attempting to address these in this collective case study, my analysis broadly consisted of two stages: i. within-case analysis and ii. cross-case analysis (Creswell, 2007; Merriam, 1998). Within-case analysis involved a detailed analysis of each case for emergent themes or categories where each case study is ‘first treated as a comprehensive case in and of itself’ (Merriam, 1998, p. 194).
<table>
<thead>
<tr>
<th>Research question</th>
<th>Methods</th>
<th>Data Sources</th>
<th>Data analysis</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are teachers' perceptions and knowledge base of</td>
<td>Teacher interviews; where relevant, augmented with lesson observations</td>
<td>Interview transcripts; where relevant, augmented with researcher observations</td>
<td>Constant comparative method; thematic content analysis (during within-case and cross-case analysis)</td>
<td>To understand teachers' perceptions and knowledge base of critical thinking i.e. how they view their knowledge base, how it was constructed, how it can be enriched</td>
</tr>
<tr>
<td>critical thinking?</td>
<td>based on Criteria for Classroom Thoughtfulness and Cultural Forces</td>
<td>field notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How and to what extent do teachers implement</td>
<td>Lesson observations based on Criteria for Classroom Thoughtfulness and</td>
<td>Researcher observations field notes and interview transcripts; where</td>
<td>Constant comparative method; thematic content analysis (during within-case and cross-case analysis); vignettes of practice based on Criteria for Classroom Thoughtfulness and Cultural Forces (critical incidents)</td>
<td>To understand the manner and extent critical thinking is implemented; its role in their teaching; the enabling and disabling factors of implementation</td>
</tr>
<tr>
<td>critical thinking in the classroom?</td>
<td>Cultural Forces; teacher interviews; students' work samples and other</td>
<td>relevant, augmented with documentary analyses of students' work samples,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>relevant documents</td>
<td>relevant school and policy documents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What are students' perceptions of critical thinking?</td>
<td>Student interviews; where relevant augmented with lesson observations</td>
<td>Interview transcripts; where relevant, augmented with researcher observations</td>
<td>Constant comparative method; thematic content analysis (during within-case and cross-case analysis)</td>
<td>To understand how students perceive critical thinking; its role in their learning, upper secondary &amp; pre-university students' perceptions of themselves as 'thinking learners'; a means of triangulating teachers' data analysis</td>
</tr>
<tr>
<td></td>
<td>based on Criteria for Classroom Thoughtfulness and Cultural Forces</td>
<td>field notes and school and policy documents</td>
<td></td>
<td></td>
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</tbody>
</table>
Table 6 illustrates the research methods, data sources and data analysis used in addressing each of the research questions.

In addressing the research questions 'What are teachers' perceptions of critical thinking?' and 'What are students' perceptions of critical thinking?', transcripts of interviews with teachers and students were the primary sources of data for analysis given the aim of eliciting participants' perceptions. However, relevant lesson observations field notes and documentary analysis of policy documents and students' work samples played a supplementary and triangulating role in addressing these questions. Where appropriate, they were incorporated into the analysis of the interview data.

I essentially employed the 'constant comparative method' (Glaser & Strauss, 1967) which 'involves comparing one segment of data with another to determine similarities and differences' (Merriam, 1998, p. 159) in each data set. Through the content analysis of interviews (Silverman, 2005), I compared the categories that emerged from these, via iterative coding processes, and then compared and contrasted them with classroom observations as well as data gathered from documents.

**Categories and coding**

Categories are described by Taylor and Bogdan (1998) as 'concepts indicated by the data (and not the data itself)' (p. 139) and category construction is seen as data analysis itself (Merriam, 1998). My formation of these categories, while primarily an intuitive process in qualitative research (Merriam, 1998; Patton, 2002; Stake, 1995), was 'systematic and informed by the study's purpose, the investigator's orientation and knowledge, and the meanings made explicit by the participants themselves' (Merriam, 1998, p. 179). This meant that the formation of categories used and eventual themes that emerged during analyses were also informed by notions found in the relevant literature and the study's framework discussed in Chapter 2. The continuing section explains the different codes used during analyses.
Codes used for the analysis of teachers’ understandings of critical thinking:

CV  cognitive view of critical thinking i.e. critical thinking as cognitive skills and process

DV  dispositional view of critical thinking i.e. critical thinking as having a dispositional and characterological aspect

Codes used for the analysis of teachers’ knowledge base of critical thinking and teachers’ classroom implementation and practice of critical thinking:

IU  Intuitive understandings of critical thinking i.e. understandings attributed to teachers’ intuition rather than the result of professional learning.

CF  Contextual factors i.e. factors that are a result of teachers’ individual context such as schooling experience, personal reflections, students’ attitudes and abilities and teachers’ beliefs.

SF  Systemic factors i.e. factors that are attributed to the larger educational system and structure such as teacher education, professional development programmes, national curriculum demands, mandated examinations, policies and time.

CTK Critical thinking knowledge i.e. knowledge of explicit theories and conceptions of critical thinking and/or of thinking frameworks. CTK pertains to the declarative knowledge (knowing that) aspect or the ‘what’ of critical thinking.

CTPK Critical thinking pedagogical knowledge i.e. knowledge of the existence of the pedagogies, strategies and approaches to teaching critical thinking as they are used in teaching and learning settings. CTPK pertains to the procedural (knowing how) and conditional knowledge (knowing why) aspect, or the ‘how’ aspect of critical thinking as it relates to the knowledge of the pedagogical applications of strategies that encourage and elicit critical thinking.
in the classroom.

CTPCK Critical thinking pedagogical content knowledge is an emergent form of knowledge that goes beyond the three components of content knowledge, pedagogical knowledge and critical thinking knowledge. This knowledge is different from knowledge of a disciplinary or critical thinking expert and also from the general pedagogical knowledge shared by teachers. It is a special class of knowledge that is central to teachers' practice of critical thinking. This knowledge would not typically be held by non-teaching subject-matter experts; teachers who know little of critical thinking; professed critical thinkers who know little of the subject or of pedagogy; and teachers who know either little of that subject or critical thinking.

PCK Pedagogical content knowledge (discussed in Chapter 2)

Codes used for the analysis of students' perceptions of critical thinking

CP Contextual practices i.e. practices that are engendered by students' schooling contexts that include rote learning, didactic teaching and pragmatic learning attitudes.

SP Systemic practices i.e. practices that are engendered by the larger educational system and structure that includes an examination-driven educational system and emphasis towards high-stake testing.

Upon completing the first stage of analysis, I then proceeded with the second stage of analysis — cross-case analysis. Cross-case analysis consists of the 'thematic analysis across all the cases accompanied by assertions or an interpretation of the meaning of the case' (Creswell, 2007, p. 75). In the course of the second stage, I also attempted to yield an abstraction of the cases (Merriam, 1998, 2009) and an understanding of the inherent processes and outcomes in these cases; how they were shaped by various

126
circumstances in order to provide ‘more sophisticated descriptions and more powerful explanations’ (Miles & Huberman, 1994, p. 112). The presentation of the findings follows from this final stage of analysis.

Consistent with qualitative analysis, my aim was also ‘to reflect the complexity of human interaction by portraying it in words of the interviewees and through actual events and to make that complexity understandable to others’ (Rubin & Rubin, 2005, p. 202). To achieve this, excerpts of participants’ quotes from transcripts were incorporated in the discussion of the findings to substantiate the thematic categories that emerged from the analyses across the cases.

In case studies, data analysis also requires the examination of issues that ‘pull attention both to ordinary experience and also to the disciplines of knowledge’ (Stake, 2006, p. 10). Accordingly, the analysis and interpretation of teachers’ and students’ perceptions and practice of critical thinking, as suggested earlier, not only drew on the areas discussed in the research framework, but also on my prior experience, knowledge and understandings as a former Singaporean teacher. On this point, Rossman and Rallis (1998) aptly suggest that ‘analysis and interpretation are an expression of your individual understanding of the phenomenon’ (p. 179).

**Assessing the quality of the study**

In reviewing the literature on qualitative methodology, it is evident that the notions of validity and reliability in research are contested, even among qualitative researchers themselves. Wolcott (1994), Richardson (2000) and Lincoln and Guba (1985) argue that these concepts are not applicable to qualitative studies. They suggest that the paradigmatic assumptions underpinning qualitative research call for a reconceptualisation of the notions of validity and reliability that befit them. Referring to alternative concepts, Lincoln and Guba (1985) suggest ‘credibility as an analog to internal validity; transferability as an analog to external validity; dependability as an analog to reliability, and confirmability as an analog to objectivity’ (pp. 76-77). Elsewhere, the concept of ‘crystallization’ is proffered in place of validity and
reliability in which the object of triangulation is not assumed to be fixed and that ‘there are more than three sides from which to approach the world’ (Richardson, 2000, p. 934).

However, while these alternative notions have been postulated, I am mindful that much debate still persists. Merriam (1998, 2002) even questions whether such a conceptual consensus is possible in qualitative research as does Patton (2002) who remarks that ‘it seems unlikely that a consensus is on the horizon’ (p. 576). In light of the ongoing discourse on validity and reliability in qualitative research, I maintain that the use of these notions in the qualitative study is far from being the ‘absurdity of validity’ that Richardson (2000) suggests it is.

Patton (2002) remarks that qualitative researchers such as Glaser (2000) and Miles and Huberman (1994) have a common goal in their references to validity and reliability. That is, ‘to use qualitative methods to describe and explain phenomena as accurately and completely as possible so that their descriptions and explanations correspond as closely as possible to the way the world is and actually operates’ (Patton, 2002, p. 546). I make the same argument here as one of my aims in this research is for it to ultimately resonate with a greater audience. I suggest that reference to these conventional notions of validity and reliability does not necessarily compromise a qualitative study as much as reference to their ‘analog’ alone can enhance it. On the contrary, I believe the employment of these referents can help bridge semantic gaps for such an audience, thereby making the study to some extent epistemologically accessible.

I propose that it is the strategies that I have incorporated in the establishment of validity and reliability — that are consistent with much qualitative research — which matter more than reference to the ‘analog’ of these constructs. Mason (2002) argues for a similar stance when she writes:

I think the concern (for overall questions of accuracy in research methods and research practice) should be expressed in terms of ensuring — and demonstrating to others — that your data
generation and analysis have not only been appropriate to the research questions, but also thorough, careful, honest and accurate (as distinct from true or correct — terms which many qualitative researchers, of course, wish to reject). (p. 188)

As such, the crux of the intellectual aversion against the notions of validity and reliability among some qualitative researchers, I contend, is precipitated more by their traditional quantitative connotations rather than their designated purpose and function in research. That is, as criteria or referents to assess the integrity of a study. And, as how Patton (2002) remarks of Scriven's (1998) views on subjectivity and objectivity in educational research, I find such 'language of objectivity serviceable' (p. 575). Therefore, consistent with the case study design as put forth by Merriam (1998) and Yin (2003), I employ the notions of validity and reliability as 'serviceable' referents to assess the qualitative study. This is consistent with other qualitative studies in the area of teacher knowledge and practice (e.g. Gruberman, 2005; Grossman, 1990) and other writers (e.g. Mason, 2002; Maxwell, 2005; Silverman, 2005) who have employed them in qualitative research literature.

**Establishing validity**

Having an acute awareness of reflexivity was the gateway to establishing the study's validity and reliability. Lincoln and Guba (2005) define such reflexivity as 'the process of reflecting critically on the self as researcher, the "human as instrument"' (p. 210) or the positioning of the researcher in the research. This reflexivity was further mediated by 'emphatic neutrality' that suggests 'that there is a middle ground between becoming too involved, which can cloud judgement, and remaining too distant, which can reduce understanding' (Patton, 2002, p. 50).

The researcher's position that I assumed was that of a Singaporean teacher who had taught for a number of years in government schools. Based on my professional experiences and knowledge as a teacher, I made the assumption that the development of critical thinking under the TSLN vision is still considered essential in preparing future citizens. Justified by my experiences in teaching General Paper (GP), I made the observation, which
was shared by other colleagues, that a majority of students do not demonstrate critical thinking skills and dispositions, and, by and large, the development of these skills and dispositions were not a major focus in learning generally. While some subjects such as GP and English Literature owing to their nature and objectives may develop some of these skills, most other subjects do not appear to be so.

Being a teacher, I also assumed that while the teacher held a vital role in developing students’ critical thinking, the teacher is at the same time shaped by situational contexts. This meant that beyond the complexities of the classroom, it is school leadership and organisational priorities that broadly determine and define what teaching and learning is and the kinds of teaching and learning that take place, especially in the pragmatic Singaporean context which is result driven and one where academic success is still greatly seen as the key to life’s success.

Thus, in conducting this research I held these assumptions and bring into it my experiences as a former student and teacher in the Singaporean context. These prior experiences were valuable in providing insight, especially in the understanding of the nuances and subtleties that exist in the Singaporean educational context and that of participants’ meanings.

Yet, I acknowledge that these very experiences could be a liability that can prejudice the data analysis and interpretation. Along with the assumptions and methodological orientation made explicit earlier, I attempted to mitigate these biases by engaging in on-going critical self-reflection through personal research memos and dialogue with the study supervisors (Bloomberg & Volpe, 2008). A highly experienced Singaporean teacher colleague also reviewed the study, offering her critical insights and perspectives, forming yet another means of peer review.

Furthermore, consistent with the qualitative case study design, other strategies were used. In addressing the notion of internal validity these were method triangulation or using multiple data sources; member checks; peer review and providing an audit trail (Merriam, 1998, 2009; Patton, 2002; Stake,
1995, 2000; Yin, 2003; 2009). Figure 4 provides an overview of the strategies used to establish the quality of the study.

Multiple data sources or method triangulation by way of interviews, observations and documents were used. In the context of classroom research in which teachers are not always able to articulate their knowledge (Kagan, 1990), using multiple data sources allowed teachers to articulate their knowledge and practices during interviews and for teachers’ knowledge-in-action (Schön, 1983) to be observed through lesson observations. Importantly too, using multiple data sources allowed me, the researcher, to corroborate and challenge different data sets, leading to more veracious understandings in the study. Furthermore, as part of member checks, interview transcripts were vetted by teacher participants. The study’s tentative findings were also shared for further member checking of my interpretation of the data.

Figure 4: Overview of strategies used to establish the quality of the study
An audit trail (Guba & Lincoln, 1981) or a paper trail essentially provides a clear logical chain of how the study moves from one phase of the case study process to another — from methodological procedures, data collection and protocols to the concluding evidence (Yin, 2003). In this thesis, the audit trail comes in the shape of the ‘detailed account of how the study was conducted and the data analysed’ (Merriam, 2002, p. 27). This has been expounded in this chapter in which the research design, data gathering methods, data analysis and coding were discussed.

Like internal validity, external validity is another debatable notion in qualitative research in which some writers (e.g. Bogdan & Biklen, 1998) have pointed to its inappropriateness in qualitative studies. However, some qualitative methodologists (e.g. Merriam, 1998, 2002, 2009; Stake, 1995; Walker, 1980) argue that a variant notion of generalizability can still be employed within qualitative research and, in my view, more so in educational research.

Contrary to positivistic notions, this includes appealing to concepts such as working hypotheses (Cronbach, 1975), concrete universals (Erickson, 1986), naturalistic generalizability and reader or user generalizability (Merriam, 1998, 2002). While these concepts overlap one and another in certain respects, the notions of naturalistic generalizability and reader or user generalizability are considered appropriate in the context of educational research that ultimately aims to impact practitioners and their practices (Merriam, 1998).

In reference to naturalistic generalizability, Stake (1995) writes that ‘full and thorough understanding of the particular’ enables one to notice similarities ‘in new and foreign contexts’ (p. 6). Similarly, reader or user generalizability impels the researcher to provide enough information on the issues that will allow the reader to ponder ‘What is there in this study that I can apply to my own situation, and what clearly does not apply?’ (Walker, 1980, p. 34). It is this notion which is key in making this piece of educational research relevant to teachers as they consider the salience in similarities of their own contexts with that of the research to effect their practices.
In trying to establish these variants of generalizability, it was therefore important for me to provide comprehensive and ‘thick descriptions’ (Geertz, 1973). This came in the shape of the descriptions of the schools, the teachers and their beliefs in order to portray the ‘typicality’ of the cases so that readers would be able to compare how these cases studies apply to their own contexts. And, consistent with previous studies on teacher knowledge (e.g. Gruber, 2005; Grossman, 1990) using a multisite case or collective case study design in this research also provides readers with the latitude to utilise the study’s findings in a wider range of situations and contexts (Merriam, 1998, 2009).

Chapter summary

This chapter explicated the key and interdependent aspects of my qualitative study. In particular, I discussed the:

- justification of a qualitative methodology and case study strategy;
- paradigm that underpinned my research, the research participants, research site, research ethics, data gathering methods and the analysis of the data; and
- criteria used for assessing the study and the strategies employed to establish its quality.

Chapter 4 discusses the research findings in which I begin by delineating the chapter’s aims and explaining its various sections.
CHAPTER 4

UNDERSTANDING TEACHERS' KNOWLEDGE AND PRACTICE OF CRITICAL THINKING

Introduction

Chapter 3 articulated the study's methodology, research design and outlined the methods employed in the study. It also explicated the research sites and participants and the criteria used to assess the study. Chapter 4 begins the discussion of the study's findings and their presentation is essentially informed by Peshkin's (2000) perspective of interpretation which 'entails perceiving importance, order, and form in what one is learning that relates to the argument, story, narrative that is continually undergoing creation' (p. 8). As such, the findings of the study presented in this chapter (and in Chapters 5 and 6) attempt to relate them to the argument introduced in Chapter 1 — that is, the current state of teachers' knowledge base and practices of critical thinking remains a major barrier to the realization of TSLN's critical thinking thrust in which students' perceptions of critical thinking are ultimately affected.

The study's findings relating to the teacher participants are organized into two chapters — Chapters 4 and 5 — according to the emergent themes in the findings that address the first and second research questions respectively. Arising from the cross-case analysis which encapsulates the respective 'patterns of distinctiveness' (Beattie, 2004) or subthemes that were evident during the within-case analyses, the two main emergent themes that are discussed in this chapter are gaps and uncertainties in teachers' knowledge base in Part I and contextual and systemic factors shape teachers' knowledge base in Part II.

Following the categories used in the content analysis of the interview data and the lesson observations field notes, as discussed in Chapter 3, these emergent themes bring together both the common and individual experiences and understandings of the teachers in the study.
However, I am mindful that the themes formulated are but artificial constructs. Therefore, they do not presume arbitrary and unnatural distinctions among themselves. On the contrary, they are designed only to guide the reading and understanding of the data and my representation of them. To disregard the artificiality of themes would imply that I could disentangle the webs of individual meanings and thoughts from teachers’ individual experiences and actions (Gruberman, 2005). This is far from being the case — I frequently found all these to be enmeshed and interwoven. Echoing Gruberman (2005), ‘the inherent complexities and dynamics of each [theme] cannot be [injudiciously] uncoupled if we are to understand fully how … teachers come to understand and practice higher-order thinking’ (p. 134).

In my cross-case analysis, I found that there were layers of similar and contrasting themes that gradually emerged from each case. I subsumed minor themes within major themes to build a coherent reconstruction and understanding of the teachers’ thoughts and experiences. In light of addressing the research questions, this involved working and reworking upward and downward the layers of themes (Creswell, 2005) and refining them until I arrived at the broader themes that encapsulate the minor themes arising from the within-case analyses. The construction of these themes were largely drawn from the study’s framework that include critical thinking, teacher knowledge and the Singaporean TSLN context (see Figure 2 on p. 96), and the prior understandings and experiences that I bring to the research as a former teacher in the Singaporean education system, as discussed in Chapters 1 and 3.

**Sketches of the teacher participants**

Consistent with the case study approach (Merriam, 1998, 2009; Stake, 1995, 2008), this chapter first introduces the participants before presenting the findings. This is aimed at providing the background of teacher participants and a ‘sketch’ of their pedagogical beliefs, reasons for being a teacher, and their understandings of the TSLN policy. In light of my constructivist perspective of ‘multiple realities’, I hope that this also allows readers to engage in their own reconstruction of the participants’ understandings and
experiences discussed in subsequent parts of this chapter and Chapter 5. In other instances, this may assist the sense of readers' generalizability, allowing the readers to individually ponder: 'What is there in this study that I can apply to my own situation, and what clearly does not apply?' (Walker, 1980, p. 34).

Furthermore, having an understanding of the teachers' theories and beliefs is crucial because they constitute an essential component of teachers' general knowledge through which teachers perceive, process and enact information in the classroom (Clark & Peterson, 1990; Munby, 1982). In the words of Harvey (1986), these theories and beliefs

are a set of conceptual representations which signify to its holder a reality or given state of affairs of sufficient validity, truth or trustworthiness to warrant reliance upon it as a guide to personal thought and action. (p. 660)

Therefore, as Fang (1996) stresses, 'regardless of the forms they take, a teacher's beliefs or philosophy can affect teaching and learning in one way or another' (p. 50). Importantly, the presentation of teachers' pedagogical beliefs and understandings can help position the teachers 'as evolving individuals, not abstract subjects in a study [because] each person is a synthesis of their experience, knowledge, and context' (Gruberman, 2005, p. 135). This being the case, I hope that providing this context can indeed assist in understanding the discussion of each teacher's experiences and perceptions as they are presented.
Sean
Sean is in his early forties and has been teaching for over 10 years in government schools. Married and a father, he attended an overseas university in Canada and attained a Bachelor's degree in Literature before undertaking his teacher education. He graduated from the National Institute of Education (NIE) with a Postgraduate Diploma in Education (secondary) and taught English and English Literature at a secondary school for more than five years. At the time of this study, he had been teaching English Literature for three years at the junior college. Before becoming a teacher, Sean had worked in a number of professions. This included being an accounts clerk, a business partner and serving in the Police Force as part of his national service.

WHY I TEACH
'Teaching was the melting of personal passions ... it was a passion for my subject area that got me into teaching ... I saw teaching as a sharing of interest, sharing of ideas, perceptions about the world, about people ... and reaching out to younger people.'

WHAT 'THINKING SCHOOLS, LEARNING NATION' MEANS
'Thinking is not a one-off acquired piece of knowledge that cannot be transferred, but is a skill that can be reapplied and used in different contexts and for different objectives. It has made me more aware of the need to make our young better critical thinkers, and to make them better aware of their own thinking.'

PEDAGOGICAL BELIEFS
'Teaching of Literature as a path to an awakening of sorts [and] the intellectual pursuit and the understanding of the world; To get the students to formulate their independent reasoned opinions about something; Students learn best when they are challenged in different ways; 'Generating further thought and critique of ideas would be my preferred approach because I think students need to be passionate about what they are thinking about, to really think and apply themselves and to do that where I can.'

Figure 5: A sketch of Sean
Roy

Roy is in his late thirties and has been teaching for over 10 years in government schools. Unlike the other teachers in the study, he did not attend university, opting instead to join teaching after his pre-university education and national service in the Armed Forces. Being a generalist teacher, he has taught a number of subjects at the different grade levels of primary school. He has been teaching in the same school since he graduated from the NIE with a Diploma in Education (primary). On top of his teaching duties, he holds the position of Discipline Master, managing student disciplinary issues and student welfare within the school.

**WHY I TEACH**

'always wanted to be a teacher'; 'love for kids'; 'impacting my knowledge as rewarding'; 'satisfaction from teaching cannot be measured'; 'the passion ... keeps me moving.'

**WHAT 'THINKING SCHOOLS, LEARNING NATION' MEANS**

'a school that is continually learning and thus it... will be pervasive throughout the nation - to engage in continually learning whereby learning also is ... a process of thinking through critically'; 'it starts with the teacher where teachers should continually upgrade themselves so as to better themselves and this in turn will benefit pupils as skills learnt from professional development can be used and developed in the classroom'; 'learning takes a different meaning where spoon feeding is no longer the focus. Creativity and innovation is the focus now.'

**PEDAGOGICAL BELIEFS**

Teaching is not only educating pupils where academic results are concerned but also about teaching a child holistically, from values to academic results to simple things like basic courtesy and manners, teaching the 'whole aspect of the child'; 'teaching students values, providing them with an education, clarifying thoughts and remedying misconceptions'; 'no one effective way to teach students; 'students learn better when they experience it rather than by giving them information'; 'every child who comes into the class brings with him different experiences'; 'My style of teaching is based on students' learning abilities.'

Figure 6: A sketch of Roy
Nathan
Nathan is in his mid thirties and has been teaching for more than 10 years in government schools. He is single and graduated from the local university with a Bachelor's degree in Arts after completing his national service in the Armed Forces. Nathan joined the teaching service upon graduation. He has taught in two secondary schools since graduating from the NIE with a Postgraduate Diploma in Education (secondary). Among the subjects which he has taught are English and History. At the time of this research, however, he was teaching only English. He has been with the current school for three years and, like Roy, he is Head of Student Management and deals with student discipline and welfare issues.

WHY I TEACH
'Being a teacher was the answer to the question of What am I good at? '; 'Enjoys interaction with the pupils'; 'Seeing results in students gives me satisfaction'; 'Teaching is a form of community service that pays well, one which is great for the soul and pocket.'

WHAT 'THINKING SCHOOLS, LEARNING NATION' MEANS
'the whole vision of schools being a place to think rather than to receive' knowledge'; TSLN is positive and necessary because of the way the world is evolving, the kinds of challenges that youths face today and will face as adults, will not be as predictable.'

PEDAGOGICAL BELIEFS
'Teaching as consisting of two parts — the academic and skills which will help students succeed in life... They are not separate but go hand in hand in the classroom'. Effective teaching is seen as first understanding students' ability; you got to know where your students' strengths, weaknesses lie. This is done through assessments, through questioning'. 'Establishing good teacher-student rapport is key'; 'Students learnt best in small groups and learn more effectively when what their learning is contextualised within the things they can relate to' 'Approaches a typical lesson with a focus on process.'

Figure 7: A sketch of Nathan
Yvonne

Yvonne is a beginning teacher in her early twenties who has been teaching for about eight months. She graduated from the NIE with a Postgraduate Diploma in Education (secondary). Prior to this, Yvonne attended the local university and graduated with a Bachelor's degree in Social Work and Sociology. Yvonne teaches English at lower secondary level in the secondary school where Nathan also teaches.

**WHY I TEACH**

'love to interact with teenagers and children'; 'fascinated by them being lively, energetic and full of fascinating ideas'. 'My internship ... helped me to understand that I can play a part to help young people develop into responsible and educated individuals by teaching them and being a role model to them... working with a few dysfunctional families during my [Internship], I have realised that education plays a very important role in determining the well-being of a family ... by becoming a teacher, I can help to educate the younger generation and thus, help more families to achieve stability and well-being.'

**WHAT 'THINKING SCHOOLS, LEARNING NATION' MEANS**

'... schools play a crucial role in promoting critical thinking and continual learning among all citizens in a nation. This is because schools are the proper channels to educate its people and by promoting the development of critical thinking among the students, students can then develop the various thinking skills and this in turn helps to develop a learning culture among its people as people apply the critical thinking skills even after they graduate from schools.'

**PEDAGOGICAL BELIEFS**

'Teaching means enriching my students' lives and equipping them with skills to cope with future life'; 'For teaching to be effective, you have to make lessons more interactive' because teacher-centred or teacher teaching style is no longer so effective'; 'No one effective way that students learn best because different students have different needs so you got to cater to those needs.'
Evelyn

Evelyn is in her mid twenties and is a beginning teacher with about two and a half years of trained teaching experience. She joined teaching after graduating from the local university with a Bachelor’s degree in Arts. Upon completing teacher training at the NIE and attaining the Postgraduate Diploma in Education (secondary), she was posted to teach at a junior college. As a junior college teacher, she specialises in teaching only one subject which, in her case, is General Paper (GP) (refer to p. 3 for earlier description of GP).

WHY I TEACH

‘Joined teaching because of both personal and situational factors ... It was a stable career and one that could bring a sense of personal gratification. Moreover, the economy was doing badly and there were few jobs available ... so, teaching seemed to be the stable job and one that gave more meaning...and...some form of personal satisfaction in knowing that I am indeed doing something that means more than just money and the usual pragmatic aspects.’

WHAT ‘THINKING SCHOOLS, LEARNING NATION’ MEANS

‘...educating the young to learn and think for life.’

PEDAGOGICAL BELIEFS

‘Teaching as the process of making the person a truly educated person — one who has values ... and who doesn’t only know the hard facts but also learns to use them wisely after serious evaluation of his or her own values’; ‘It incorporates two elements: giving content knowledge that will help students to understand how the world works in general and providing the knowledge and developing the skills that each student needs in General Paper’. Teaching is also about seeing that the student is brought up as a morally upright person; ‘Learning is about being motivated, having passion and purpose which involves the process of discovery and the absorption of knowledge’; ‘Thinking is central to the learning process because it is a primary determinant behind how and why a student learns.’

Figure 9: A sketch of Evelyn
Ivan

Ivan is a beginning teacher in his mid thirties and is also a generalist teacher who had been teaching a number of subjects which include Science, English and Mathematics in a primary school. He attended a local university where he attained a Bachelor's degree in Business Administration after completing his national service in the Armed Forces. He graduated from the NIE with a Postgraduate Diploma in Education (primary). Before signing up to be a full-time teacher, however, Ivan was a real estate agent and later worked as a relief teacher for a few years.

Figure 10: A sketch of Ivan
PART I

GAPS AND UNCERTAINTIES IN TEACHERS’ KNOWLEDGE BASE

Introduction

Part I of Chapter 4 addresses the research question: *What are teachers’ perceptions and knowledge base of critical thinking?* Data from interviews with teachers were specifically used to analyse the depth and dimensions of teachers’ conceptualisations and their knowledge base of critical thinking. The emergent subthemes discussed below constitute the broad theme *gaps and uncertainties in teachers’ knowledge base.*

Cognitive dimension of critical thinking: ‘skills’ conceptions

The cross-case analysis revealed that teachers in the study largely shared common conceptions of critical thinking. Every teacher conceptualised it as primarily involving skills and cognitive processes such as ‘analysing’ and ‘evaluating’. For instance, Sean primarily viewed critical thinking as a ‘form of evaluation or analysis’. A critical thinker for Sean is one who displays

an ability to effectively analyse and evaluate a proffered statement, essay, or opinion in order to understand the thinking and motivation behind such ideas, the validity of the ideas, and the significance of the ideas.

Similarly, Evelyn perceived critical thinking as thinking that ‘would involve some thorough analysis’. It also includes having the ‘ability to see things beyond the superficial level’. She described a critical thinker as a person who ‘will be self-motivated to think for the sake of thinking’ and one who is ‘logical, introspective and reflective’. In doing so, she, in effect, made an explicit distinction between critical thinking skills and traits in her conception of critical thinking, which the other teachers did not seem to do. Beyond skills and processes, her notions of critical thinking also incorporate the key dispositional and characterological dimension (Costa, 2001a; Ennis, 1990;
Paul, 1995; Ritchhart, 2002; Tishman et al., 1995) — a dimension which other teachers in the study appear unable to articulate explicitly.

Nathan understood critical thinking as 'a deeper level of thinking as in not just recalling facts', which is a lower-order thinking skill as highlighted in Bloom's Taxonomy (Bloom, 1956; Anderson et al., 2001). His conception of critical thinking extends to Bloom's higher-order thinking skills such as 'analysis' and 'evaluation' (Bloom, 1956; Anderson et al., 2001) with the ability to reason. Nathan claimed critical thinking involves

... applying known facts to various situations in different contexts. Being able to explain how they derive a certain answer and also being able to explain why certain answers are better than others. Sort of evaluation as well.

Emphasising the importance of being able to analyse and evaluate, a critical thinker in Nathan's view is a person who

is able to question the concepts and ideas presented to him with sound intellectual capacity and also able to understand the process of thinking adopted by the people around him as well as his own.

Echoing Nathan, Yvonne perceived critical thinking as having the kind of thinking that requires one ‘to go deeper ... to go beyond the surface of things’. She also equated it to ‘analysing’ and having to think about something ‘more thoroughly’. Similarly, a critical thinker for her is someone ‘who thinks deeper than the surface of things and analyses the various details to come up with an opinion or conclusion’.

Like Yvonne, Ivan defined critical thinking as ‘deep thinking’. However, he also seemed to have incorporated a metacognitive dimension — ‘thinking about your thinking’ (Paul, 1995, p. 91) in his conception when he remarked: ‘You just don’t look at things on the surface; you think deeper, you reflect, especially before and after you want to do something’. On a similar note, Ivan viewed a critical thinker as a person who ‘reflects and looks at issues from different perspectives'.

144
However, when Roy was asked about his understanding of critical thinking, he initially said, 'I am not very sure.' But in spite of not having a clear conceptual understanding, he attempted to articulate the notion by 'breaking it down into these two things'—'critical' and 'thinking'. He explained:

For me when I teach my pupils, when I talk about thinking, it's about them thinking through their answers logically. Hopefully it's logically in their heads, and then based on what they think, they provide me with the answers.

Roy elaborated what he meant by 'thinking', referring to an instance in a lesson:

For example, when I was teaching Maths earlier, when I asked them to divide a certain number, let's say, '21 divided by three', they could give me the answer. Some of them could give me the answer as 'seven' but I am not happy with that answer, that's not good enough. The answer is not important but how to get the answer is. So, it's more of the thinking process whereby they get the answer.

It is in the context of such classroom examples that Roy framed his understanding of critical thinking, illustrating a form of thinking-in-action (Schön, 1983). Roy further perceived the critical thinking process in students as 'how they formulate their thoughts and from these thoughts, make a logical assumption based on the way they think'. Essentially, 'critical thinking is how you run things in your head, analyse things and from there, come up with the answer'. Roy did not make a distinction between critical thinking skills and dispositions in his understanding of critical thinking, preferring to conceive critical thinking primarily as a cognitive process. Critical thinkers in his view are 'people who are able to perhaps question the questions or answers' and 'who are not willing to just accept answers as they are being presented'.

Roy did not think that all critical thinking skills are important as his primary emphasis lies on one main skill — metacognition. He saw this skill as the central platform in which his students can develop a sense of personal awareness of their thought processes, echoing some notable theorists of
thinking processes (e.g. Costa, 2001a; Harpaz, 2003; Marzano, 1988; Ritchhart, 2002; Tishman et al., 1995). It is through such metacognitive processes that he felt students learn and develop thinking skills. He explained:

To me, metacognition is important, that’s all. It is important for them to develop their thoughts. It is a process, to think through their answers, to make changes to their answers if need be before finally presenting their answers. To me, if they are able to break down their answers and to critically think through their answers, then, they would have succeeded in learning and also understanding processes instead of the normal rote learning. It will develop their thinking skills and their thought process.

‘I’m no expert’: teachers’ sense of knowledge inadequacies

All the teachers in the study described their knowledge base of critical thinking as falling in between the ‘expert’ and ‘novice’ level. Given that their conceptualisations — or what I view as indications of their critical thinking declarative knowledge or critical thinking knowledge (CTK)\(^3\) — are generally limited to the skills dimension and the cognitive view of critical thinking, this is not unexpected. None of the teachers described themselves as ‘experts’ or ‘complete novices’ in incorporating critical thinking in lessons — that is, their critical thinking procedural knowledge or critical thinking pedagogical knowledge (CTPK)\(^4\) — and in their CTK. For instance, in his assessment of

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\(^3\) Critical thinking knowledge (CTK) refers to the knowledge of explicit theories and conceptions of critical thinking (e.g. Ennis, 1991; Facione, 2006; Paul, 1995) and/or thinking frameworks (e.g. Marzano’s (1988, 1992) Dimensions of Learning and Dimensions of Thinking, Lipman’s P4C). This knowledge includes knowledge of critical thinking skills and/or processes, thinking dispositions and intellectual standards. In sum, it relates to the declarative knowledge (knowing that) aspect or the ‘what’ of critical thinking. Given its emergent nature, this knowledge domain together with its associated domains of the critical thinking knowledge base is fully explicated in Chapter 7.

\(^4\) Critical thinking pedagogical knowledge (CTPK) refers to the knowledge of the existence of the pedagogies, strategies and approaches to teaching critical thinking as they are used in teaching and learning settings. It includes the knowledge of how to employ different strategies of incorporating and engaging with critical thinking during teaching (e.g. Socratic questioning (Paul & Elder, 2007), thinking routines (Ritchhart, 2002), fertile questions (Harpaz & Lefstein, 2000). In sum, it refers to the procedural (knowing how) and conditional
what, in effect, was the CTK he possessed, Sean ‘would not say it’s very high’. Similarly, Nathan described himself as ‘definitely not an expert’ in the area. In terms of what could be seen as his CTPK, however, Nathan saw himself more between the ‘basic and intermediate range’. He elaborated:

In terms of theory [i.e. CTK] I think it is pretty much basic. If you talk about the literature of critical thinking [I know of] or professional courses attended, I think it’s pretty much basic. But in terms of application, as in the kinds of questions I try to ask my students [i.e. CTPK], I mean I may not have a theoretical base on this, but I think [I am on the] basic and intermediate range, but definitely not an expert.

Evelyn described her knowledge base of critical thinking in the same vein. She felt that she has ‘some knowledge of critical thinking’ (i.e. CTK) but ‘is still learning’ and ‘still experimenting different ways to encourage’ critical thinking and ‘the different styles’ of incorporating it (i.e. CTPK). Echoing her, Roy described his knowledge base in similar terms and remarked, ‘In terms of pedagogy [i.e. CTPK], I wouldn’t say I am an expert, I wouldn’t say I am very weak, but I think I am still learning’. Here, both Evelyn’s and Roy’s experiences suggest that what can be more specifically viewed as their CTPK seem to benefit from teaching experience, paralleling the similar development of PCK as found in the literature (e.g. Bullough, 2005; Hasweh, 2005; Nilsson, 2008).

Yvonne would not describe herself as being an expert, or a ‘professional’, in terms of her knowledge base of critical thinking. Likewise, Ivan described his knowledge base as being ‘inadequate’. Being a beginning teacher, he attributed this to his general lack of teaching experience when he remarked, ‘I have always felt inadequate in terms of pedagogical skills partly because I

knowledge (knowing why) aspect, or the ‘how’ aspect of critical thinking as it relates to the knowledge of the pedagogical applications of these critical thinking strategies. Given its emergent nature, this knowledge domain together with its associated domains of the critical thinking knowledge base is fully explicated in Chapter 7.
am still new to the job.’ This is consistent with studies that suggest beginning teachers’ pedagogical knowledge base is less developed in comparison with experienced teachers (Borko, Bellamy & Sanders, 1992; Bullough, 2005; Cochran & Jones, 1999; Carter, 1990; Hasweh, 2005; Nilsson, 2008).

**Driven by ‘instincts and gut-feel’: intuitive and discipline-based understandings of critical thinking**

All the teachers in the study expressed that their knowledge base of critical thinking, more specifically their CTK, is a product of their intuitive understandings, rather than an explicit subscription to particular theories. For instance, Sean admitted that he has ‘not spent time thinking about critical thinking’ because most of what he does in class is driven by personal ‘instincts’ and ‘gut-feel’ and not a result of any explicit theories of critical thinking to which he subscribes.

However, although all teachers revealed that their conceptions of critical thinking are largely a product of their intuitive thinking rather than an explicit adherence or adoption to particular theories, two teachers’ conceptions and understandings seem to be largely influenced by the respective syllabus aims and objectives of their subjects. In terms of Grossman’s (1989, 1990) notion of pedagogical content knowledge (PCK), it could be said that teachers’ conceptions of critical thinking are influenced to some extent by their knowledge of curricular materials. This is illustrated in the cases of Sean and Evelyn.

Sean’s understanding of critical thinking mirrors one of the learning outcomes contained in the General Cambridge Examination (GCE) ‘A’ level English Literature syllabus, that is, ‘students will be able to analyse and evaluate critically the construction of a text’ (MOE, 2008a; emphasis added). While Sean did not explicitly articulate this connection, it nevertheless seems that his understanding of critical thinking is influenced — either subconsciously or incidentally — by the subject, English Literature, he taught.

Critical thinking would involve some form of evaluation or analysis at whatever level; that would be an evaluation of the terms of argument.
or definitions, evaluation of ideas. So to me critical thinking, you basically look at the situation or ideas, and you apply some form of analysis to it. Bottom-line, I think that's what critical thinking is to me and beyond that, of course, to be able to support what you are saying with references to examples. (emphasis added)

Evelyn's understanding of critical thinking also seems to be influenced by the subject she taught. Like Sean, her knowledge base of critical thinking appears to be influenced by the categories of knowledge that constituted her PCK (Grossman, 1990). Evelyn sees that the most important critical thinking skills that need to be developed in students are the 'ability to evaluate with logical reasoning' and the 'ability to compare and contrast'. These cognitive thinking skills that she accords importance were also crucial in the achievement of the aims of the subject she taught, General Paper, that is, to 'develop the skills of evaluation of arguments and opinions' (MOE, 2007), which effectively is a key aspect of critical thinking (Ennis, 1991; Facione & Facione, 2000; Paul, 1995).

In the same manner, Roy's understanding of critical thinking — the way students 'run things in their head' — is influenced by the pedagogy he employed in teaching his students Mathematics or his PCK (Shulman 1986, 1987). As he remarked, in this subject, it is the task of understanding students' thought processes and the manner in which they arrive at their answers which is key.

Discussion

The data suggest that teachers' conceptions of critical thinking are essentially limited by virtue of their viewing critical thinking under the cognitive, or the skills dimension. While these perceptions are consistent with certain conceptions of critical thinking discussed in Chapter 2, they are insufficient in terms of the requisite knowledge base that is needed to fulfil TSLN's aim of developing 'thinking learners' who possess the necessary critical thinking skills and dispositions.
The common patterns of distinctiveness emergent in all teachers’ responses suggest that, collectively, there are gaps and uncertainties in teachers’ knowledge base of critical thinking. As Figure 11 shows, these are: the skills conceptions of critical thinking; intuitive and disciplined understandings of critical thinking, and teachers’ sense of inadequacy of their knowledge base of critical thinking.

Teachers’ conceptions of critical thinking, or illustrations of their CTK in particular, are shown to be limited to the skills dimension or the cognitive view of critical thinking. Furthermore, despite their varying teaching experience, all of them expressed a similar sense of inadequacy in terms of their knowledge base. This knowledge base of critical thinking is shown to be largely a product of their own intuitive thinking and, not as the data indicate, the result of a systematic and explicit development either during teacher training or during professional development.

Figure 11: Gaps and uncertainties in teachers’ knowledge base
In terms of their limited conceptions of critical thinking, all the teachers, apart from Evelyn, did not make an explicit distinction between critical thinking skills and dispositions. For most of them, critical thinking is perceived as a type of cognitive process consisting of a range of skills and their conceptualisations of critical thinkers indicate a similar emphasis on cognitive abilities and skills. For instance, Sean perceived critical thinking as a form of ‘evaluation’ and ‘analysis’ and Roy saw it as a ‘logical’ thought process. Similarly, critical thinkers for them are those who are able to perform a cognitive skill or process. Nathan, Yvonne and Ivan perceived critical thinking as a form of ‘deep thinking’ but Evelyn is the only teacher who showed an awareness of critical thinking as comprising both the cognitive and dispositional aspects (Costa, 2001a; Ennis, 1990; Paul, 1995; Ritchhart, 2002; Tishman et al. 1995).

Furthermore, Sean and Evelyn who taught subjects which explicitly require students to demonstrate critical thinking skills are the most aware of the nature of critical thinking; as suggested, they conceptualised critical thinking in alignment with their subjects’ aims and objectives. For them, these aims correspond to some of the aspects of critical thinking that they articulated. In other words, their content knowledge and curricular knowledge which constituted their PCK appear to interact with their knowledge base of critical thinking, namely the CTPK (critical thinking pedagogical knowledge) and CTK (critical thinking knowledge) categories.

However, I am mindful that it is not always the case that what the teacher knows can be articulated (Kagan, 1992). For instance, while Roy could not readily articulate his notion of critical thinking, he seems to have illustrated his understanding through a form of knowledge-in-action (Schön, 1983), a knowledge which a teacher cannot always readily articulate. And as Kagan (1992) also suggests, ‘teachers do not always possess language with which to describe and label their beliefs’ (p. 66).

Nevertheless, while teachers’ conceptions of critical thinking as involving cognitive skills and abilities are clearly consistent with certain notions of critical thinking in the literature discussed in Chapter 2 (e.g. Facione ,1984 &
Ennis, 1991), they are insufficient in terms of the prerequisite teacher knowledge base needed in fulfilling TSLN's aim of developing 'thinking and self-regulated learners' (CPDD, 1998). While the development of thinking skills is undoubtedly key, teachers' conceptions of critical thinking as a mere repertoire of cognitive skills is insufficient for the effective implementation of curriculum that explicitly emphasizes the development of students' critical thinking (Beyer, 1997; Bailin et al., 1999; Golding, 2006a; Paul, 1995; Tishman et al., 1997, Resnick, 2001; Costa, 2001b; Zohar, 2004). In terms of their knowledge base, teachers' CTK needs to encompass a more expansive conception of critical thinking so that their implementation entails the development of not only critical thinking skills, but critical thinking dispositions as well.

In the context of TSLN's aspirations of developing 'self-regulated thinking learners', understanding the notion of critical thinking as incorporating dispositions and its characterological dimension is fundamental (Costa, 2001a; Marzano et al., 1988; Ritchhart, 2002; Tishman et al., 1997). Teachers' CTK needs to incorporate this understanding given that the task of implementing thinking under TSLN encompasses the development of both thinking skills and dispositions (CPDD, 1998). This is more so, when teachers' implementation of critical thinking in the classroom is largely predicated on their understandings and knowledge of critical thinking (Beyer, 2001b; Bailin et al., 1999a; Gruberman, 2005; Onosko & Newmann, 1994; Paul, 1995; Ritchhart, 2002), or as suggested their CTK. For example, Ritchhart (2002) and Gruberman (2005) found that teachers' conceptions of higher-order thinking influence the manner in which they attempt to promote it in the classroom. Importantly, this also suggests that in the case of the knowledge base of critical thinking, the centrality of a strong base of CTK in the development of CTPCK (critical thinking pedagogical content knowledge) and in the subsequent effective implementation of critical thinking in the classroom.

Research elsewhere also suggests that it is indeed vital for teachers to attain and possess the adequate understanding and knowledge base if they are to
incorporate critical thinking in their teaching effectively (Gruberman, 2005; Newmann, Onosko & Stevenson, 1990; Zohar, 2004). For instance, in their study on the most effective strategies in developing higher-order thinking classrooms, Newmann et al. (1990) found that it was crucial that teachers develop a clear conceptualisation of thinking. Similarly, Ritchhart (2002) found that teachers’ teaching of thinking is dependent on their understandings of it. In other words, teachers’ CTK must be adequate and developed for effective implementation to follow.

Therefore, in the context of TSLN’s aims of developing both students’ skill and the dispositional dimension of critical thinking, as discussed in Chapter 2, teachers’ perceptions of critical thinking importantly need to encompass a more holistic understanding. That is, teachers’ CTK must include the conception of critical thinking that goes beyond the notion of it being merely comprising cognitive skills and incorporate the dispositional or characterological dimensions, as emphasized by scholars (e.g. Ennis, 1990; Costa, 2001a; Paul, 1995; Ritchhart, 2002).

Teachers’ perceptions of the knowledge base of critical thinking they possess also suggest that they are remarkably similar in spite of the varying extent of their teaching experience. None of the teachers perceived themselves as having a rich knowledge base or being ‘experts’, regardless of teaching experience. In contrast to the notion of the authority of experience (Munby & Russell, 1994), this indifference of experience — in which teaching experience has little impact on enriching teachers’ pedagogical expertise — suggests that while teachers may perceive that their knowledge base of critical thinking benefitted generally from their teaching experience, it does not necessarily grow and develop naturally with experience. This is unlike PCK which has been found to do so in studies discussed in Chapter 2 (e.g. Borko, Bellamy & Sanders, 1992; Cochran & Jones, 1998; Hasweh, 2005; Munby et al., 2001; Nilsson, 2008).

One reason which may account for teachers’ shared sense of an inadequate knowledge base of critical thinking is it being a product of their intuitive understandings. There is no indication of an explicit subscription to particular
theories derived from teacher education or professional development. Teachers' admission of their intuitive understandings here parallels Jackson's (1986) and Lortie's (1975) suggestion that many teachers rely on intuition and personal experience rather than reflective thought and professional education in their teaching. Their admissions underscore how the lack of CTK corresponds with teachers' sense of inadequacy in their overall knowledge base of critical thinking.

Furthermore, teachers' intuitive and disciplined based understandings of critical thinking suggest that it is their PCK that mainly guided their efforts at incorporating critical thinking. In the absence of a developed CTK domain, teachers appear to have drawn on their PCK in their efforts to implement critical thinking in practice. As discussed, this is evident especially in the cases of Sean, Evelyn and, to a lesser extent, Roy.

However, in the context of the TSLN policy that explicitly emphasizes critical thinking, a specialised knowledge base of critical thinking is needed for critical thinking to be implemented effectively in practice (Zohar, 2004; Zohar & Schwartzcer, 2005). If PCK is seen as the requisite knowledge to teach subjects effectively, then the equivalent of this in implementing critical thinking during teaching effectively is critical thinking pedagogical content knowledge (CTPCK)\(^5\). It is CTPCK which can be viewed as that 'special form of knowledge' (Zohar & Schwartzcer, 2005) — more than just PCK — which is essential in teaching critical thinking. Supporting this assertion are the works of Beyer (1997), Paul (1995), Nisbett (1990), Golding (2006a) and Leat (1999). The salient theme arising from their works, as discussed in Chapter 2, is that the extent of the teacher knowledge base of thinking determines the

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\(^5\) Critical thinking pedagogical content knowledge (CTPCK) is defined as a special class of knowledge that is central to teachers' practice of critical thinking. This knowledge would not typically be held by non-teaching subject-matter experts; teachers who know little of critical thinking; professed critical thinkers who know little of the subject or of pedagogy; and teachers who know either little of that subject or critical thinking. It is an emergent form of knowledge arising from the interaction of content knowledge, pedagogical knowledge, pedagogical content knowledge and critical thinking knowledge. Given its emergent nature, this knowledge category and its associated domains of critical thinking are fully explicated in Chapter 7.
efficacy of the implementation of a curriculum that explicitly emphasizes thinking. In other words, it is teachers' level of CTPCK that predisposes the effectiveness of implementing critical thinking in the classroom and not PCK alone.

Teachers in the study indicated that they do not possess a well-developed knowledge base of critical thinking. But, they clearly illustrated the keen awareness of the role of critical thinking in the TSLN vision and an appreciation of the importance of the development of students' critical thinking within this policy in spite of their lack of awareness on the importance of critical thinking in the citizenry in a democratic society (Dewey, 1938; Costa, 2001; Lipman, 2003; Paul, 1995; Winch, 2006) beyond formal schooling. Nonetheless, as teachers' gaps and uncertainties in their knowledge base suggest, teachers' awareness and appreciation of critical thinking in the policy do not appear to be commensurate with the systematic development of teachers' knowledge base of critical thinking.

In light of the emergent theme teachers' gaps and uncertainties in the teachers' knowledge base, questions about teacher preparation and development can be raised; more so, under the education system that sees critical thinking as one of the main thrusts behind the fulfilment of the TSLN policy. The assumption that is made with the implementation of this policy is that teachers, as the ultimate agents of curriculum implementation (Hargreaves, 1992, 2000; Fullan, 2001; Darling-Hammond, 2000), would be equipped with a sound knowledge base of critical thinking, or specifically CTPCK, to make implementation effective.

In the next section, the theme contextual and systemic factors shape teachers' knowledge base highlights the factors that teachers perceived to have shaped their knowledge base and what they perceived can enrich it. In doing so, the theme also sheds further light on the issues raised here about the role that teacher education and professional development played in the development of the teachers' knowledge base of critical thinking.
PART II

CONTEXTUAL AND SYSTEMIC FACTORS SHAPE TEACHERS’ KNOWLEDGE BASE

Introduction

The emergent themes from the content analysis of teacher interview data in Part II of Chapter 4 illustrate how teachers acquired their current knowledge base of critical thinking and highlight the manner and extent to which certain factors can be attributable to the shaping of this knowledge base. In addition, the factors draw attention to what teachers believe can enrich and further develop their knowledge base of critical thinking. Collectively, these emergent patterns constitute the broader theme contextual and systemic factors shape teachers’ knowledge base. And as with Part I of the chapter, Part II addresses the first research question: What are teachers’ perceptions and knowledge base of critical thinking?

‘I don’t recall that’: the tangential impact of teacher education

All teachers in the study indicated that teacher education is not a significant factor in the construction and development of their knowledge base of critical thinking. Generally, the role of teacher education is tangential rather than targeted, systematic and structured. Sean, who underwent teacher training about 10 years ago, did not receive any explicit teacher training in critical thinking that can be considered to be significant in the development of his knowledge base. He cited that apart from the reflections he was required to make during practicum and in the modules on pedagogy in the subjects English language and English Literature, there was little else.

... there was no direct teaching of critical thinking at all. I don’t recall that at all, not at that time anyway. If any kind of critical thinking was done, it was pretty incidental. But most of it came in terms of pedagogy and from the practicum teaching aspect, from the teaching ... But in class itself, I don’t remember any kind.
Furthermore, Sean found that, as a teacher trainee, he was 'not challenged as much'. Although there were workshops in teacher training 'that asked you to think', he felt that teacher training was short on this. In this regard, it appears that a systematic development of his knowledge base of critical thinking was significantly absent, contrary to the NIE initiatives to support teaching thinking under TSLN (Seng, 1998). He noted such absence during his time at NIE:

... there was [little] of the actual practice of a guiding critical thinking framework or some explicit techniques of encouraging people to think [critically]...or how critical thinking actually works...

Sean also found that the 'culture of thinking' (Ritchhart, 2002, 2008), discussed in Chapter 2, as an 'entirety' was 'lacking' as it only 'features here and there' during teacher education. In fact, he did not recall 'even thinking about critical thinking' during this time as it was far from being a prominent part of teacher training.

This significant lack of emphasis on developing a thinking culture during teacher education is also echoed by Evelyn. Like Sean, she pointed to her tertiary education that exposed her to critical thinking rather than teacher education.

... another thing is the training I went through more in university [that was more significant] rather than NIE which is quite ironic because in university, we engaged more in the exchange of ideas and we were encouraged to think freely. So, perhaps, that shaped my character. But when I went to NIE they tried to do it but it became very contrived ... Maybe the intention was there but somehow the execution was not very clear ... And if they want us to critically think, are they able to give us the room to think in the first place?

The absence of a culture of thinking in Evelyn's case was characterised by her perception of a harboured 'hidden agenda' and the lack of space for 'debating the meaning' behind certain professional development sessions provided. Evelyn explained why there was a sense of a 'hidden agenda':

157
You can see it subtly when the trainer tries to inculcate certain values in you; they treat you like secondary school kids. They just tell you: OK this is why we do it because we are doing it for the good of the students, without actually debating the meaning behind it. So that's what I mean by agenda. So at the end of it we just feel: OK, fine. You just want me to accept all these facts and for me to pass, I just have to agree with you.

In the case of Yvonne, she remarked that she encountered the concept of critical thinking and learnt about it from 'hearing it from my lecturer' and a module during teacher training. Through a class project, this elective module on differentiating able learners indirectly exposed her to the concept of critical thinking and effectively shaped her CTK (critical thinking knowledge) domain to some extent. However, Yvonne felt that she 'really didn't understand the concept' as the module provided her with little knowledge on the applications of critical thinking or the 'know-how'. In other words, she experienced little by way of developing her CTPK (critical thinking pedagogical knowledge). Much of it, she described, was 'just information telling me what critical thinking is' that helped developed her CTK. She recounted:

... when I was in NIE, I did a project which touched on critical thinking but I realized at that point in time, I really didn't understand the concept ... What I get is just information telling me what critical thinking is. But how I apply it ... I'm not quite sure.

Yvonne also pointed to the occasions when she heard 'people talking about it'. She described the result of the acquisition of her knowledge base in critical thinking as being 'more informal and incidental', rather than anything which was systematic and explicit.

However, Nathan found that while teacher training at the NIE did not explicitly enrich and widen his knowledge base of critical thinking, it did influence the way he approached teaching. He cited the example of tutorial discussions of mini-lessons and the feedback received from the class and the course lecturer during these sessions which encouraged the development of his own critical thinking.
... in setting certain assessment questions ... you got feedback from your peers and tutors on the kind of question types you set ... what's the focus of the lesson, does it enable students to think deeply, some of these issues.

Nathan added that the knowledge he acquired mainly came from 'stuff like Bloom's taxonomy' during teacher education. However, he could not 'pinpoint anything very direct' that could be attributed to the development of his critical thinking knowledge base while at the NIE. Although he felt that 'the foundation modules you do in NIE ... do cover some thinking aspects', dedicated coursework modules that taught critical thinking or critical thinking instruction which could be viewed to develop directly and ultimately his CTPCK (critical thinking pedagogical content knowledge) were absent. Like Yvonne, he felt that what was lacking at the NIE was the training in 'application', or CTPK. He remarked that whatever knowledge he acquired was 'largely theory and application was limited'.

Similarly, Ivan found that although there was no explicit form of teacher training that could be seen to develop directly his CTPCK, there were some modules at NIE that implicitly encouraged the application of his own critical thinking. For instance, case studies that were discussed as part of some modules compelled teacher trainees 'to reflect deeper' on the inherent issues. Like Yvonne, he felt that 'most of it was theoretical' and therefore had limited impact on the development of his CTPCK. He found that little of the knowledge he acquired could be transferred to practice in the classroom, showing how teacher education did not systematically develop his CTPCK.

By contrast, Roy was somewhat uncertain if what he had undergone during teacher training could be described as critical thinking in the first place. Suggesting that little, if any, of his knowledge base of critical thinking was explicitly developed during his time at NIE, he recounted his experiences in rather vague terms:

... it may not be critical thinking but something we had to do and be able to explain. Something was given on the board and we were given time to think through and then to say what we wanted to say. I
am not so sure. It did play a role, I believe, in my schooling days. We may have also done it but subconsciously, I would say. It may not be mentioned to us explicitly, but somehow subconsciously you would have done it.

Tangential and piecemeal professional development

All the teachers commented that they have not attended any explicit professional development related to critical thinking and that which aimed to enrich their CTPCK (critical thinking pedagogical content knowledge). Most teachers felt that the professional development they received or attended did not explicitly target the development of their knowledge base. That is, there was no coherent and systematic professional development programme that specifically developed their CTPCK.

Sean and Evelyn felt that their knowledge base of critical thinking was not enhanced by any 'exclusive' professional development courses on critical thinking or critical thinking instruction. Some professional courses that they attended, however, did indirectly encourage 'more thinking and some evaluation of what we were doing'. In the case of Evelyn, professional development courses in the shape of seminars or lectures helped. But these neither developed her knowledge base nor aimed to do so. Instead they appear to have developed her content knowledge (CK) and in the way she thought of issues because the lectures 'bring in different perspectives' on the issues related to the subject she taught, General Paper.

However, Evelyn felt that a departmental 'sharing' on questioning techniques developed her knowledge base, or more specifically, her CTPK. A staff-sharing on critical thinking instruction — conducted shortly after Evelyn began her teaching career in the college — was beneficial in this aspect. It showed her how critical thinking can be taught to students 'systematically', contrary to her earlier beliefs about it. Yet, some professional development courses that she attended drew a different reaction. What left her reeling and wondering about the value of the teacher workshops to her professional development seems to be the lack of recognition of the teachers as intellectuals (Giroux,

... when I went for courses at the Teachers’ Network\(^6\), [the trainers] always have an agenda and certain values. So, at the end of it, you feel that you are not treated as a thinking person. In fact, they treat you like idiots. They try to instil certain skills, but at the end of it, they don’t make me think.

Similarly, Roy and Ivan, who taught in the same school, felt that the professional development they received on questioning techniques made a significant impact and shaped their understandings of how they can implement critical thinking in the classroom. In effect, it specifically developed their CTPK (critical thinking pedagogical knowledge). For instance, where Ivan was given the opportunity to acquire some CTPK in the shape of questioning strategies that foster critical thinking, he found it to have a profound impact in the way he conducted his lessons; it widened his CTPK albeit only ‘for a while’ because after attending the workshop Ivan ‘actually paused and did more thinking when asking questions in the classroom’.

Nathan also noted how attending professional development on questioning techniques opened up his mind to the different questioning techniques ‘which may trigger a deeper level of thinking’, developing his CTPK. However, the professional development that he attended as part of the review of the Humanities syllabus also provided him with the most comprehensive training among the teachers in the study in terms of incorporating critical thinking.

The review in the syllabus changed the aims of the subject Nathan was teaching and the way he taught, effectively compelling him to revise his CK (content knowledge) and PK (pedagogical knowledge), which also constitute his PCK (Abell, 2008; Grossman, 1990; Mishra & Koehler, 2006; Nilsson, 2008; Shulman, 1987). It precipitated a change of pedagogical focus — from

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\(^6\) Teachers’ Network is an organization that provides teacher professional development in Singapore.
'rote learning' and 'memorisation' to the training of 'skills', which is consistent with calls of initiatives such as Teach Less, Learn More (MOE, 2005b) under TSLN (see earlier discussion in Chapter 2) — and aimed 'to develop the students more critically'. Within the new framework, students were expected to be 'trained in a set of skills', departing from the old methods of 'rote learning' and 'memorisation'. The change in focus involved the indirect development of students' higher-order thinking skills to enable them to make inferences, comparisons and contrasts and assess the reliability and utility of sources in the new syllabus. In terms of developing students' critical thinking, the new focus, which guided the revised syllabus, seems to be informed by an infusion approach (Beyer, 1997; Moore, 2006).

As part of the retraining of teachers, professional workshops provided Nathan with practical training in areas such as the setting of examination questions and in the assessment of student scripts, which developed his knowledge of the curriculum (Grossman, 1990; Shulman, 1987). However, while he was trained in assessment matters, there was little offered in terms of pedagogy, or CTPK. The workshops also did not provide him with the theoretical understanding and rationale that lay behind the new changes, or CTK. Nathan explained:

We didn't deal with the theory and literature behind these changes except that it was communicated to us that the education ministry want to develop the students more critically.

Therefore, although Nathan had been prepared in terms of student assessment or knowledge of the curriculum, the professional development did not directly develop the pedagogical knowledge base needed to enact changes to classroom practice. In other words, the CTPCK required was ultimately not addressed in the same way.

By contrast, being a new beginning teacher with about eight months of experience, Yvonne had not attended any professional development course that she could describe as shaping her knowledge base of critical thinking. The only professional development sessions that she attended since graduation were in effect aimed at the development of her context knowledge
(Abell, 2008; Nilsson, 2008) and CK. These sources of her development came in the shape of workshops in classroom management and the teaching of grammar.

Personal reflections and experience

While not all teachers in the study cited their current knowledge base of critical thinking was developed by their personal reflections during their teaching experience, three teachers did so. Roy traced the knowledge he has acquired ‘over the years’ primarily through his own personal reflections and experience rather than through any particular professional development on critical thinking.

I don’t think I have attended such workshops or courses ... but over the years, I question myself, especially in the early part of my teaching years ... as to whether my students have understood my lessons. So, in order for me to find out, I needed to ask questions like ... ‘Was my question good enough or was it too simple?’ So sometimes, I thought it was too simple ... and decided to ask them to explain answers.

Through his experience and reflective practice, Roy found getting his students to explain and ‘reason out’ their answers to be an effective pedagogical strategy to develop their thinking. This seems to have a consequence of developing his knowledge base, specifically his CTPK.

... my knowledge of critical thinking, as I have explained, is one aspect of it; there are many aspects of critical thinking ... I notice that when I ask students to reason out and if they are able to reason out and give a fairly logical answer, chances of them understanding are greater.

Similarly, Ivan felt that his reflections helped in the development of his knowledge base. Apart from the professional development session on effective questioning that he attended, which seems to have developed his CTPK, Ivan felt that the informal and incidental experiences were also influential.
Besides that course, we didn’t have anything explicit. It was more of working with different people and after that thinking how they thought about certain things and I actually learnt from them. So it was more my own reflection that helped.

Ivan claimed that he also learnt other strategies and ways of improving his teaching through the exchange of ideas and the observations of ‘senior teachers’. As a beginning teacher, who felt ‘inadequate’ about his teaching, such exchanges and observations could be seen as developing his pedagogical knowledge and, more generally, his PCK, rather than his knowledge base of critical thinking directly.

Yvonne and Evelyn traced the knowledge base they had of critical thinking through their own reading. Evelyn shared that the readings she made on critical thinking from the internet and library gave her a better understanding of critical thinking. This seems to have developed, specifically, her CTK and CTPK.

[The readings] made me evaluate my assumptions on what critical thinking is. My original assumption was that critical thinking couldn’t be taught systematically but through reading these books, I learnt it can be.

Evelyn also pointed to the experience that she gained over the two years as being the source of the knowledge base she possessed. She cited how the experience of teaching different cohorts of students enriched her: ‘I was exposed to different students. So, the experience helps [and] I learnt along the way.’ However, as in the case of Ivan, Evelyn’s remarks here indicate that she did not make a conscious distinction between the development of her PCK of General Paper (GP) per se and her CTPCK. Instead, like Ivan, Evelyn equated the development of her PCK to her CTPCK.

**Teachers’ schooling experiences**

Teachers’ schooling experiences also play a role in shaping their knowledge base of critical thinking. The impact of these experiences on their knowledge base, however, varied from teacher to teacher. While some teachers saw
that such experiences made a great impact, others felt less so. In the case of
Sean, apart from deriving his knowledge of critical thinking from ‘instincts’ and
‘gut feel’ (Jackson, 1985; Lortie, 1975), he attributed his knowledge base to
the university education he received. While Sean was not explicitly taught
critical thinking as an undergraduate, the experiences he had with his
university teachers shaped his understandings of critical thinking.

Sean saw his experiences of having ‘passionate’ university teachers who
inspired him with ‘their ability and their desiring to share and defend their
views’ as having significance on his pedagogical beliefs and, more generally,
what appeared to be his PK.

... the experience with my university teachers ... makes a difference
to the way I do things in class ... and that provides a challenge, and
also influenced me to elevate the whole discussion to a higher
level ... so that’s one of the things I try to bring to my teaching.

The way Sean’s university teachers impressed upon him the importance of
formulating independent reasoned opinions was at the core of his
pedagogical approach. This also seems to shape indirectly his CTPK. He
explained:

[University education] did play a role [in my understandings of critical
thinking]. I had some very passionate teachers and I mean
passionate is one thing I can absorb. But what about the teachers
that always stretched me, who were inspiring, was that they had ...
views on texts and things in life and all that. It is ... their ability, their
desiring to share ... and defend their views. I think that partly had me
reflecting a lot about things and ... [got me] suggesting to students
all the time that having opinions is important.

Thus, for Sean, the ‘apprenticeship of observation’ (Lortie, 1975) in the form
of these experiences became a pedagogical message he had to impart to his
students as a teacher. That is, of not merely blindly accepting conventional
opinions and beliefs, ‘of not just rebelling for the sake of rebelling, but having
an idea of what you are doing and having an opinion about something’.

165
Similarly, as stated earlier, Evelyn also pointed to her tertiary education that developed her understandings of critical thinking rather than teacher education.

Like Evelyn, Yvonne’s university education was not an explicit source of her knowledge base of critical thinking.

I’ve never heard my lecturers talking about critical thinking. But I guess the methods that they used to teach us are a way of getting us into critical thinking. Now that I’ve thought about it, the work that I was given, the things that I was asked to do during tertiary education, they did make me go into critical thinking because most of the time, we were analysing cases, like for Social Work and Sociology modules as well.

The flip-side: enriching teachers’ knowledge base

Although the teachers indicated that their education and professional development were largely tangential in the shaping of their knowledge dimension, they believed that there are some ways in which their knowledge base can be enriched and further developed. All the teachers felt that attending professional courses, either as part of teacher education or professional development and learning, can be a significant source of developing their knowledge base of critical thinking.

Situated professional learning

In the cases of Ivan, Roy, Nathan and Evelyn, the knowledge of questioning techniques acquired as part of a professional development course made a significant impact in the way they incorporated critical thinking through questioning of their students during lessons. More specifically, this acquired knowledge can be seen to develop their CTPK (critical thinking pedagogical knowledge), and, in general, their CTPCK (critical thinking pedagogical content knowledge).

Moreover, the teachers' knowledge base of critical thinking can be enhanced through teacher education and professional development if they have a
practical orientation and are situated in their daily classroom experiences. Evelyn and Yvonne pointed out that for professional learning to be beneficial in the context of developing their knowledge base in critical thinking, it should provide 'some hands on application', 'practical knowledge' or 'know-how'. The application of critical thinking teaching 'strategies' in the classroom should not just stop at theory alone. In other words, they must explicitly develop their CTPK together with their CTK domains. Yvonne's comments typify the teachers' sentiments with regard to the nature of professional learning in this area.

There should be courses on how you carry out critical thinking rather than telling me what it is because I think we need the strategies to know about how to go about doing it. It's no use telling me what is critical thinking because we all know the definitions, we can research this in books and the internet but we need to know the know-how [i.e. CTPK].

However, Roy felt that receiving practical guidance 'would even be more beneficial than attending the courses'.

But I think the guidance provided by an experienced practitioner or an expert would even be more worthwhile. For example, I may teach in a class and the expert practitioner may provide help, guidance and mentor. I think that would be more beneficial and meaningful.

In illustrating how having practical guidance was 'beneficial', Roy described what was happening in his school as part of a professional development course of questioning techniques.

I just attended a course on questioning techniques by Dr Tee. Come term two, he will be going into our classes. We will be asking students questions and he will be here and guiding us, to provide us with the necessary help if we need it. So, it's like hands on. So, I think the experience and guidance will be beneficial.

Moreover, two teachers felt that such practical knowledge should be more specific. Sean, for instance, thought that it should be in the form of 'strategies
that involve a framework’ or ‘that which shows me exactly how I can apply the knowledge to other texts as well’. This ‘would reduce the thinking about how to actually apply it’ as well as helping him to draw the ‘relation’ between the training and ‘what I’ll be doing in classes’. But such training also has to be ‘subject specific’. This, Sean felt, would greatly reduce the time and effort needed to think of ‘how to apply it’, given the time constraints he faced. In other words, what Sean seems to intimate here is professional learning situated in his daily classroom practices that specifically develops his CTPCK (critical thinking pedagogical content knowledge).

Nevertheless, among the teachers, Nathan maintained that the theoretical knowledge of critical thinking is still important as ‘you can tie up the literature to the reality of the classroom’. In doing so, he suggested how having an adequate CTK domain plays an influential role in informing teacher practice.

... getting some grounding in the theory would be good ... it gives you more guidance when you plan, execute lessons .... it’s always good to know a bit of theory to understand your application so you can fall back and see where it lies. But, of course, I also don’t believe in subscribing to theory blindly but it would make sense to know and if I learn more of critical thinking, I think it will help me in the way I teach.

*Shared learning*

Teachers also voiced that shared learning among colleagues could be an effective way to enrich their knowledge base of critical thinking. Evelyn found that the ‘department sharings’ by senior colleagues, which represent a form of ‘discourse communities’ (Putnam & Borko, 2000), were beneficial. She also remarked how a recent sharing by two senior members of the department on ‘questioning techniques’ widened her knowledge on how to encourage critical thinking in students during lessons through teacher questioning, or more precisely, her CTPK.

Generally, more sharing between teachers are useful. Internally, we are already having sharings and you try to observe other teachers’
lessons and you realize that things can be done and thought of in different ways ... so that was quite good.

Teachers such as Evelyn and Ivan also found that supervisory ‘lesson observations very helpful’. In the case of Evelyn, comments and suggestions of ‘supervisors’ or ‘senior teachers’ helped her improve the way she taught and the ways in which she could incorporated critical thinking in her teaching, developing, more broadly, her CTPCK.

Yvonne reflected similar sentiments. She felt that ‘help from colleagues’ can be a source of support as ‘if there’s anything I don’t know how to do, then maybe I can ask’. By contrast, Ivan believed that apart from attending other professional development courses on critical thinking as part of professional development that will directly and explicitly develop his knowledge base, being presented with the opportunities for ‘interaction with teachers from other schools and with other departments from the Ministry of Education’ can be beneficial. He reasoned:

... like what I said about structure determining behaviour ... If you are in a certain structure, your behaviour will be shaped in a way. So I think that maybe going to the headquarters [i.e. working at the MOE headquarters] in future ... would shape my thinking a bit.

Discussion

The themes tangential impact of teacher education; tangential and piecemeal professional development; personal reflections and experience; and teachers’ schooling experiences show the manner in which teachers have acquired their current knowledge base of critical thinking. They also illustrate the manner and extent to which these contextual and systemic factors have contributed to the shaping of this knowledge base. By contrast, the themes situated professional learning and shared learning highlight what teachers believe can enrich and further develop their knowledge base of critical thinking. Collectively, these themes are subsumed under the larger theme contextual and systemic factors shape teachers’ knowledge base illustrated in Figure 12. In this study, systemic factors are seen as factors and
circumstances that are engendered by and attributed to the larger instituted educational system and structure, while contextual factors are the factors and circumstances created by and the result of more individual and arbitrary contexts of learning and teaching shaped by the more immediate school environment and setting, and teachers in particular. In some respects, contextual factors are also seen to be predisposed by the larger systemic forces.

Figure 12: Contextual and systemic factors shape teachers’ knowledge base

The findings suggest that teachers’ limited knowledge base of critical thinking is largely the result of the inadequacy of their teacher education and
professional learning. Rather than a criticism, this observation is more of a critique of the state of teachers in the context of impinging situational factors.

Although NIE introduced initiatives that appear to target the development of the teacher knowledge base (Seng, 1998), teachers in this study indicated that such initiatives have not been effective. Teacher education and professional learning have not developed the essential knowledge base that the teachers require to implement critical thinking in their teaching effectively — their CTPCK (critical thinking pedagogical content knowledge).

Without sound and sustained structures that are dedicated to the systematic and long term development of the teacher knowledge base of critical thinking in place, teachers flounder and cannot be expected to teach thinking effectively (Paul, 1995). As suggested previously, they resort to their own intuitive understandings and experiences in grappling with the aim of developing ‘thinking learners’ in TSLN and in the development of the requisite knowledge base.

The roles of teacher education and professional development, which are perceived as systemic factors in the acquisition and development of teachers’ knowledge base of critical thinking, are tangential and piecemeal rather than targeted and structured. Sean, for example, developed his knowledge base largely through his schooling experiences and his own beliefs about teaching his subject, English Literature, rather than teacher education or professional development. Other than a session on questioning techniques which enriched Roy’s CTPK (critical thinking pedagogical knowledge), he acquired most of his knowledge base of critical thinking through his own experiences and reflections. Teacher training did not explicitly develop Roy’s knowledge domains of critical thinking as much of it he intimated was implicit or ‘subconscious’.

By contrast, Nathan found it hard to trace the development of his knowledge base of critical thinking. Teacher training implicitly encouraged critical thinking and raised his awareness of it, but he did not benefit from any explicit training in the area. In his case, the change of the Humanities syllabus provided the
professional development that exposed him to the general aims of critical thinking but did not provide Nathan with the theoretical understanding. Although certain aspects of pedagogy such as question setting and assessment were covered as part of the professional development, there was little that was ultimately aimed at the enrichment of his CTPCK or even his CTPK which is instrumental in teaching critical thinking effectively during lessons.

The finding that the impact of teacher education in the development of teachers' knowledge base of critical thinking is tangential in shaping the teachers' knowledge base is contrary to the explication of the various NIE initiatives (Seng, 1998) discussed in Chapter 2. These initiatives were set out shortly after the implementation of TSLN and aimed at preparing teachers for teaching critical thinking and to develop effectively their knowledge base of critical thinking — more specifically in this instance, the procedural and conditional knowledge of critical thinking, or CTPK.

However, in spite of the initiatives and programmes to prepare teachers to teach critical thinking, all the teachers acknowledged that they had not benefitted from any explicit training in teaching thinking during teacher education. The modules undertaken had only implicitly exposed them to critical thinking, largely in the shape of encouraging their own critical thinking. Moreover, Sean's and Evelyn's experiences of the lack of a 'thinking culture' during teacher education, for instance, are also consistent with earlier findings that point to the lack of cognitive engagement during teacher education (Calderhead, 1988; Hoy & Woolfolk, 1989; Zeichner & Liston, 1985). Their experiences also suggest that NIE is far from being the 'sites of learning' in the same way TSLN envisions 'Thinking Schools' to be (Goh, 1997). The absence of a 'thinking culture' in teacher education and its dominant focus on mastering subject areas and methods, as teachers suggested, thus reflects a behaviouristic orientation (Giroux, 2004) and this is incongruent with the aim of preparing teachers to teach thinking.

In light of the aforementioned factors, none of the teachers spoke of a comprehensive programme that developed their knowledge base of critical
thinking. And my own experiences as a trainee teacher in NIE also support teachers’ views on the significant absence of critical thinking instruction training during teacher education. Furthermore, the review of NIE’s PGDE (postgraduate diploma in education) latest programme handbook (NIE, 2008) indicates that although there are elective modules that may broach the topic, there is an absence of any core modules that explicitly aim to develop teachers’ knowledge base of critical thinking.

The explication that assessments during teacher trainee practicum ‘will reflect the explicit need for trainees to demonstrate their ability to develop pupils’ thinking and creativity through questioning, activities and assignments’ (Seng, 1998, p. 4) is also at odds with the teachers’ experiences. None of the teachers professed that their knowledge base was significantly shaped by such experiences. My own practicum experiences also echo that of the teachers’ whereby critical thinking was not an articulated emphasis in practicum assessment. As a result, practicum did not have an explicit role in developing the knowledge base of critical thinking, as suggested by the NIE initiatives (Seng, 1998).

In terms of teacher preparation, scholars point to the importance of teacher education and professional development in the training of teachers for the implementation of thinking or in thinking instruction (e.g. Paul, 1995; Leat, 1998; Martin & Michelli, 2001; Nickerson, 1988; Underbakke & Peterson, 1993; Nagappan, 2002, 1998; Zohar, 2004). Gruberman’s (2005) study in particular suggests that teacher education and professional development experiences have a significant and direct impact on teachers’ conceptualisations and the level of their knowledge and understandings of higher-order thinking. This stresses the key role teacher education and professional development has on the development of an adequate knowledge base of critical thinking.

Paul (1995) remarks that for teachers to be able to teach critical thinking effectively, professional staff development has to be ‘long term [and] in-depth’ and that ‘teachers need years of practice critiquing and remodelling their instruction to grow out of deeply ingrained compulsive didactism’ (p. 289) —
that is, there is a need to reorientate teachers' beliefs to be consistent with the aims of teaching critical thinking through their own dialectical (Paul, 1995) reflection. This is in contrast to the NIE in-service programme for teachers that comprises '20-hour modules' aimed at covering the 'essential generic topics on thinking and learning' (p. Seng, 1998, p. 5) in which the reorientation of pedagogical beliefs have been completely overlooked.

Underbakke and Peterson (1993) also highlight the importance of a sound teacher knowledge base in sustaining the teaching of higher-order thinking to avoid it becoming 'an educational fad whose time will come and go' (p. 144). A decade on from their remarks, Nagappan (2002, 1998) still notes the lack of involvement by teacher education institutions in the preparation of teachers for thinking instruction. Berliner (1994) also emphasizes the importance of the teacher knowledge base and remarks that 'critical thinking by teachers ... requires skills, will and disciplinary knowledge' (p. 327). Above all, Nickerson's (1988) words, written 20 years ago, resonate deeply in light of TSLN aspirations vis-à-vis its current teacher preparation programmes:

It is no more reasonable to expect an individual who does know a lot about thinking to teach thinking effectively, than to expect one who does know a lot about math, or physics, or literature to be an effective teacher in any of these areas. In the long run, how successful institutionalized education will be in incorporating effective teaching of thinking in the typical classroom will depend to no small degree how much emphasis teacher training programs put on thinking in their curricula. (p. 6)

These remarks indicate that the need for a systematic development of the teacher knowledge base of critical thinking is essential. Teachers' CTPCK can only be effectively developed through sustained and integrated development programmes, rather than short term piecemeal programmes, in which teachers' beliefs are also redeveloped. Without this in place, the aim of teaching critical thinking is subject to failure.

In the absence of significant teacher education and professional development of teachers' knowledge base of critical thinking, it is unsurprising teachers
indicated their personal and professional reflections are the sources that shaped their knowledge base. Sean, Roy and Evelyn's experiences affirm studies that indicate teachers acquire their knowledge from actual practice or the 'authority of experience' (Munby & Russell, 1994) as well as reflections (Cochran & Jones; 1998; Hasweh, 2005; Nilsson, 2008; Loughran, Berry & Mulhall, 2008). However, as suggested by the themes in the previous section, such experiences and reflections have not adequately developed their knowledge base of critical thinking.

Moreover, consistent with the notion of 'apprenticeship of observation' (Lortie, 1975), Sean and Evelyn pointed to the impact of their university teachers as one source that shaped much of their knowledge base of critical thinking. Like PCK, whose one source is the apprenticeship of observation (Grossman, 1990), teachers' CTPCK also seems to be shaped by their previous schooling experiences.

Despite their experiences, all the teachers unanimously stated that professional development can be an effective means to enrich their knowledge base of critical thinking. However, such professional learning should not only be limited to the acquisition of the theoretical aspects of critical thinking which, effectively, develops their CTK. Importantly, it should be situated in classroom experiences (Putnam & Borko, 2000) and have direct applications to classroom practices (Day & Sachs, 2004; Hauron, 2008) in which teachers' CTPK and CTPCK, in effect, are developed.

Putnam and Borko (2000) also argue that for teacher learning to be effective, it has to be contextualised in teachers' daily classroom experiences rather than be detached from them. As such, it can be argued here that any training in the development of teachers' knowledge base has to be grounded in teachers' daily classroom experiences. Teachers find such specific 'know-how' and 'practical knowledge' to be the cornerstone of the enrichment of their CTPCK rather than mere 'generic' knowledge pertaining to critical thinking. Therefore, effective professional development has to be tailored to developing, more broadly, teachers' CTPCK rather than their CTK alone.
Teachers’ calls for such situated learning to take place support the view that teacher learning and development is effective when it is situated in classroom experiences and ‘intertwined with the particular contexts in which [a person] acts’ (Putnam & Borko, 2000, p.6). This also suggests that, like PCK which is grounded in classroom practice (Abell, 2008; Hasweh, 2005; Nilsson, 2008), CTPCK is, too.

Consistent with what some writers suggest (e.g. Day & Sachs, 2004; Fullan, 2001; Hairon, 2008), professional training or development has to have explicit links to classroom learning and be congruent with the teacher’s personal values and beliefs to be beneficial. For instance, in the case of Sean, the worth and impact of professional development aimed at developing his knowledge base of critical thinking are linked to a sense of how much his classroom practices can directly be enhanced by it. What teachers expressed give credence to Hairon’s (2008) remarks on professional development in the TSLN era:

Teachers find greater meaning in engaging in professional development activities that have more direct links and applications to changing and improving classroom practices. (p. 94)

The notion of collegiality in the shape of shared learning is another key aspect of professional development that teachers voiced. Onosko, Newmann and Stevenson (1990) writing in the context of staff development for higher-order thinking concur that ‘if fundamental change is to occur, it will require more intense, long-term technical assistance for teachers as well as professional development … through more collegial interaction’ (p. 48). This reference to the notion of shared learning is also key in the development of pedagogical context knowledge (Barnet & Hodson, 2001) as in CTPCK.

In sum, teachers’ calls here are consistent with what Elmore and Burney (1999) describe as effective professional development:

- emphasizing concrete classroom applications of general ideas;
- exposing teachers to actual practice rather than descriptions;
• providing opportunities for group support and collaboration; and

• involving deliberate evaluation and feedback by skilled practitioners. (Fullan, 2000, p. 259)

These characteristics echo the attributes ‘learning-focused’, ‘authentic’ and ‘collaborative’ (pp. 119-120) which Lipton and Wellman (2001) suggest professional development for ‘thinking schools’ should have. As such, it appears that the effective development of teachers’ knowledge base of critical thinking needs to be informed by the same tenets and assumptions that guide other forms of professional development.

It must be recognised too that teachers are influenced by the prevailing learning culture. Duffy (1994) asserts that having the right learning cultures that nurture teachers’ dispositions for the teaching of thinking is important and others such as Costa (2001b, 2001c) and Ritchhart (2009) make a similar point. Ritchhart argues that teachers, like students in the classroom, need a culture of thinking in the larger school context — where thinking is explicitly valued, visible and promoted — to be able to teach thinking skills and develop thinking dispositions. In illustrating this point, Evelyn felt that for teacher education to make a difference in trainees’ knowledge base of critical thinking, NIE ‘has to relook at what is their role’. Like Sean, she pointed to NIE’s ‘culture of sharing and learning’ as being a problem and explained:

If they want us to educate a new generation of thinkers, they have to look at their culture of sharing and learning because in order for you to think [NIE] could be more open in the way [it] does things instead of having an agenda over everything. So maybe look at the way in which they encourage a learning culture and how they encourage freedom of thought.

Therefore, the lack of an overarching conducive learning culture and a culture of thinking (Ritchhart, 2002) can be an impediment in developing the skills and dispositions needed in the teaching of critical thinking (Duffy, 1994; Underbakke & Peterson, 1993; Paul, 1995; Ritchhart, 2009; Zohar, 2004). In view of this, Fullan’s (2000) suggestion that ‘the development of habits of
learning that are far more likely to be powerful’ (p. 253) which is at the ‘heart’ of professional development rings true. This is significant especially when professional learning plays a key role in the development of the dispositions aspired in teachers under TSLN in which ‘[t]eaching ... [is a] learning profession ... and [teachers] must be given time to reflect [and] learn’ (Goh, 1997). As Evelyn’s comments suggest, this is also where in the aim of preparing teachers to develop ‘thinking citizens’, teacher education as a whole needs to be re-orientated. That is, a departure from a behaviouristic paradigm to a more progressive one which sees teachers not as technicians who merely execute pre determined curricula, but as intellectuals (Giroux, 1985, 1988, 2004) who also interrogate them.

**Summary of chapter**

To recapitulate, the major themes and findings arising from the data pertaining to the first research question stated at the beginning of Chapter 4 are:

- Gaps and uncertainties in teachers’ knowledge base
- Contextual and systemic factors shape teachers’ knowledge base

In continuing the arguments made in this chapter, Chapter 5 examines the manner and extent to which teachers implement critical thinking in their classrooms, addressing the second research question of the study.
CHAPTER 5

PART I

TEACHERS' KNOWLEDGE BASE SHAPES TEACHERS' PRACTICE

Introduction

The themes *gaps and uncertainties in teachers' knowledge base* and *contextual and systemic factors shape teachers' knowledge base* discussed in Chapter 4 portray the teachers' knowledge base of critical thinking and the factors that have shaped it, thus, addressing the first research question. Chapter 5 addresses the second research question: *How and to what extent do teachers implement critical thinking?* The first part of the chapter begins with the examination of the ways and extent to which teachers implement critical thinking and the emergent subthemes discussed form the broad theme *teachers' knowledge base shapes teachers' practice*.

In facilitating the portrayal of how teachers implemented what they perceived to be critical thinking, I include vignettes of teachers' practice in this section that also function as critical incidents (Patton, 2002) of teachers' implementation of critical thinking. These vignettes are based on field notes to provide a 'vicarious' characterisation of teachers' observed lessons. As mentioned in Chapter 3, the lesson observations were primarily based on the *Criteria for Classroom Thoughtfulness and Cultural Forces* that were developed from Onosko and Newmann's (1994) *Criteria for Classroom Thoughtfulness* and Ritchhart's (2002) elements of classroom cultural forces. Thus, these vignettes serve to characterise the manner and extent to which teachers implemented critical thinking in their classroom, juxtaposing the differences that existed amongst the teachers' practices.
‘I don’t really think about it’: the peripheral role of critical thinking

A recurrent subtheme and pattern of distinctiveness in examining the manner and extent to which teachers implemented critical thinking is that all teachers did not perceive the development of critical thinking as an explicit and central aim in their daily teaching. Teachers did not plan their lessons through the lenses of critical thinking and the development of students’ critical thinking assumed secondary importance on their list of instructional objectives. For instance, Sean ‘rarely’ views critical thinking as a formal notion he takes into account during lesson planning; he ‘does not think around those terms’. Instead, he frequently asks himself: ‘What can I do in class that will get students to really reflect and think?’ and planned his lessons in terms of ‘how can I get them to talk and share about what they feel and think’. This, he believes, is ‘part of my whole style of teaching where I like to challenge and push ideas’ and is also consistent with his basic pedagogical aim of ‘getting students to formulate independent reasoned opinions’. Sean remarked:

A lot of it [i.e. critical thinking that I do incorporate in class] is instinctual I feel. Questioning techniques I employ a lot in my class. That’s become a standard way that I conduct lessons, so I don’t think really about it much. ‘Am I adopting the correct framework or not?’ and to be honest, I don’t. I pretty much go with my instincts, pretty much kind of gut feel where I can push some ideas or where I can challenge some ideas and that’s pretty much how I do it.

Similarly, Roy and Ivan did not approach the designing of lessons in terms of any conscious critical thinking framework or objectives. Roy, for instance, explained:

To me, I don’t usually think of the term critical thinking but subconsciously I do it because I always generate questions for people to think; to think and to share. Sometimes, different people will think differently and I also get pupils to question — sometimes to no avail — things being taught, why certain methods or ways are correct. When I ask questions like that, it keeps them thinking.
On the same note, Roy stated that 'critical thinking plays a subconscious role'.

Common to all the teachers in the study, the teaching of critical thinking was not an explicit school aim, although the vision in Roy's and Ivan's school was to develop its students into 'a community of thinkers' among others. Both of them remarked that neither the school nor their department had a shared approach to teaching critical thinking; this was left very much to the individual teacher, as was the case with the other teachers in the study.

All the teachers recognised the importance of developing their students' critical thinking but this recognition was not manifested in practice; developing students' critical thinking did not play an explicit role in the design of lessons or during lessons. Nathan remarked:

    I don't think I create this [environment that develop students' thinking] in the class consciously though the end result — critical thinkers — is something I consider desirable. I guess on most occasions, I am dealing with the teaching and learning part, purely focused on the content.

The observations of Nathan's lessons support his statements in which much of what he was observed to have done in class were directed to content coverage. While he clearly created a non-threatening environment, there were few elements that could be seen as developing and engaging students' critical thinking. Nathan's lessons were also largely didactic given his focus on content and as a result, had few elements of classroom thoughtfulness. Questions posed in class, for example, were largely limited to closed questions that assessed understanding and required lower-order thinking skills such as remembering of information (Anderson et al., 2001; Bloom, 1956). As a result, there were few opportunities and questions for students to be engaged critically, limiting extended classroom dialogue which is pivotal to encouraging and improving thinking (Alexander, 2008; Lipman, 2003; Mercer, Wegerif & Dawes, 1999; Mercer, 2002; Paul, 1995, 2001; Wegerif, 2007).

For Ivan, Sean and Nathan, the incorporation of critical thinking strategies in lessons occurred more by chance and intuition during lessons' opportune
moments rather than by design and deliberate planning. Furthermore, the
teachers’ focus on addressing the primary objective of covering content
pushes the aim of developing student critical thinking to the periphery as a
lesson objective. Nathan’s sentiments typify the other teachers’ sentiments
about prioritising lesson content over the development of students’ thinking.
What is considered more important than the objective of developing students’
critical thinking are teachers’ concerns with the ‘content I need to cover [and]
how best to deliver the lesson’.

Although Nathan’s and Yvonne’s school adopted the Habits of Mind (HoM)
framework (Costa, 2001a) as a policy, their perceptions about them were
contrasting. Nathan did not think that ‘critical thinking is really done through
[HoM] in the classroom’. Instead, he views these habits as ‘a philosophy that
[teachers] can use to guide our students’ thinking’ in which he tries to
demonstrate to students how adopting the HoM can help them succeed.
Moreover, Nathan did not see the application of HoM as being a ‘strict
directive’. Not all the habits appealed to him in terms of value and relevance
and he found that thinking about them in terms of application was also time-
consuming — in other words, transferring his CTK to practice would take too
much lesson time. Thus, the application of HoM during lessons became
peripheral to his pedagogical considerations.

By contrast, Yvonne’s lack of teaching experience seems to have made her
value HoM more than Nathan.

[HoM] are rather effective because they make me become more
aware of the various principles that I should apply in my teaching to
help students develop critical thinking. And so I apply these
principles more consciously in my teaching.

While this may be the case, the application or reference to HoM was not
observed during Yvonne’s lessons which were more focussed on covering
content and largely didactic. Her questions mostly comprised closed
questions (Costa, 2001c) which primarily aimed at assessing students’
understanding of the content being taught. In other lessons, similar closed
questions, such as ‘Can you tell me the difference between using ‘few’ and ‘a

182
few’?’, were raised. Given that these questions have pre-determined answers, they thus offered little opportunity for students to engage with critical thinking (Black et al., 2004; Costa, 2001c).

**Questions, questions, questions: the primary means of critical thinking enactment**

Although the development of students' critical thinking is an implicit, 'subconscious' and peripheral aim for the teachers, they perceived questioning techniques as a main strategy for incorporating critical thinking in their lessons. As indicated in the introduction, the vignettes of practice of the teachers included in this section attempt to characterise the varying manner and extent to which teachers implemented critical thinking in terms of the salient elements of the *Criteria for Classroom Thoughtfulness and Cultural Forces* developed for the study and introduced in Chapter 3. The vignette commentaries included based on these elements are in italics and aimed at illustrating the extent to which the various elements of the criteria are manifested.

**Classroom thoughtfulness and cultural forces in Sean’s lessons**

**Vignette of practice 1: an excerpt of Sean’s lesson on Othello**

As Sean's students found their seats for his lesson on Shakespeare’s *Othello*, he began his class by introducing the lesson objectives for the day. The classroom, used by the college’s Drama Club on co-curricular activities days, was spacious and air-conditioned with props littered at the back corners of the room — it seemed like an appropriate place to teach Shakespearean drama. In today’s lesson, his students were to give a group presentation on *Othello* where each group was to discuss an essay question based on the play.

*In introducing the lesson objectives, Sean conveyed the expectations for students’ learning in the lesson but not explicitly for their thinking. There was also little physical evidence of thinking as an explicit focus such as in the shape of posters and pin-ups. This could be because the classroom used is not Sean’s and the students’ permanent classroom and thus they did not have the liberty to ‘personalise’ it, even if they wanted to.*

As the first group of students took their place at the front of the classroom by the visualiser to begin the first class presentation, Sean took a strategic position near the back of the room among the student audience with the benefit of a full view of his entire class. The students presenting flashed their first page of notes on the visualiser and their question for their presentation read, ‘Explain Othello’s speech. How is agony conveyed?’

*By assigning the group with the question that required them to use critical thinking skills such as ‘evaluating’ and ‘synthesising’ to illustrate their understanding of the...*
play, Sean structured challenging tasks based on the ability and the preparation of the students.

Dianne, the first student in the group, began the presentation by quoting the relevant lines to support her group’s view of how agony was conveyed in Othello’s speech. She showed further notes to provide evidence of her views at which point Sean light heartedly commented on the notes’ lack of clarity.

Students offered explanations and reasons for their conclusions without being prompted. This also seemed to be a classroom routine during such presentations.

As the group giggled and the class broke into mild laughter, Sean drew the class’s attention to one of the characters in Othello. ‘How does Othello’s choice of words evoke a sense of agony? Think how the emotive words evoke a sense of pain in Othello’, he told the class. The students, struck by the seeming potency of such questions, turned to write their notes furiously.

Sean raised challenging questions that encouraged students to think more deeply about the play and allowed time for them to think about the questions.

As the group continued and put forth one of their assertions of how agony was conveyed, Sean interjected and asked the student audience, ‘Are you fully agreeable with what they have said?’ Some students shared their views and in encouraging other students’ participation in the discussion, Sean raised a Socratic question.

Sean raised challenging questions to make the discussion dialogical and dialectical and allow for students to respond and engage with each other’s views.

His question was initially met with silence but at this juncture, Sean saw the opportunity to raise another question about the character and challenged the students’ assumptions about it. ‘How does such characterisation fit with the social mould? What do you all think?’ he asked.

These challenging questions aimed at encouraging students to think more deeply about the play and Sean allowed time for them to think about them. However, the lack of response suggests his questions were more rhetorical in getting them to think critically of the issues raised, rather than for students to respond verbally and engage in dialogue.

Again, his questions were met with little response as the students appeared to wait for him to share with them his sage comments. He duly obliged; the students stirred to life and began to scribble down copious notes as he shared with them his insights to the very questions he had raised for the class to respond. As Sean went on to explain his opinions and proceeded to the whiteboard to write these down, there were no questions from his students; they seemed more intent on listening and note-taking rather than be engaged by his thought-provoking questions.

Sean again raised challenging questions that aimed to engage students and allowed the time for students to think about them. However, students seem used to not engaging with them, usually choosing to allow Sean to dominate the discussion as they took notes. Although all the students appeared attentive during the lesson, very few students were active participants in the discussion that Sean tried to initiate with them. Due to the students’ reticence, there were minimal dialogical and dialectical exchanges among Sean and his students during the lesson.
The vignette of Sean’s practice typifies the manner and extent to which Sean incorporated critical thinking during the observations of his lessons. Based on the *Criteria for Classroom Thoughtfulness and Cultural Forces*, a number of elements were observed to have occurred. In assigning students to tackle the essay question for presentation, Sean structured challenging tasks for his students. He constantly posed questions as a means of encouraging students to express themselves and formulate reasoned opinions — the essence of his pedagogical aims. Such questions characterise ‘thoughtful’ and ‘powerful questions’ (Beyer, 1997; Costa, 2001c) that engage and foster students’ critical thinking.

However, it was not always the case that most of Sean’s students verbally responded and engaged with his questions as the vignette shows. This was despite the fact that Sean was observed to pause in between his questions to allow students the opportunity to articulate their thoughts. Such pauses function as ‘wait time’ (Rowe, 1974, 1986), or what Costa (2001c) also calls ‘think time’ (p. 367), which is seen as crucial in allowing students the time to develop their responses and, consequently, their quality of thinking (Beyer, 1997; Brooks & Brooks, 2001; Black, Harrison et al., 2004; Costa, 2001c; Rowe, 1974).

Although few students engaged with his questions, it was apparent Sean’s questions were aimed at evoking students’ critical thinking on the ideas that were being discussed. His questions such as ‘Are you fully agreeable with what they said?’ and ‘What do you all think about the assumptions of the character in terms of fitting the social mould?’ parallel ‘Socratic questioning’ (Paul, 1995; Paul & Elder, 2007). During teacher-initiated group discussions in other lessons, a few of his students were also observed to raise Socratic ‘clarifying’ and ‘implications’ questions (Paul, 1995; Paul & Elder, 2007) such as ‘Do you mean that women are portrayed in both positive and negative light in the play?’ and ‘On the basis of that argument, would it imply that Othello is reinforcing the negative stereotypes of women?’. Sean’s questions that sought students’ understanding of the play and elicited their critical responses
are not only typical of a GCE A level English Literature examination question (MOE, undated), but also manifest his perception of what critical thinking involves:

an ability to effectively analyse and evaluate a proffered statement, essay, or opinion in order to understand the thinking and motivation behind such ideas, the validity of the ideas, and the significance of the ideas ... and to back it with references.

Students’ work samples also indicated that their assigned tasks encouraged them to employ critical thinking skills. Questions in Literature essay tasks, such as ‘Othello is much more than a study in sexual jealousy. It is a tragedy about the loss of faith. Do you agree?’ and ‘Discuss the opinion that Prospero exerts a harmonising influence in the world of The Tempest’, required students to draw on a variety of critical thinking skills and processes (Anderson et al. 2001; Bloom, 1956; Ennis, 1990; Facione & Facione, 2006; Paul, 1995): to formulate their opinions; consider alternative viewpoints; and provide reasons and evidence for their assertions. Next to using critical thinking skills, the questions also compelled students to draw on the body of knowledge they possessed (in this case the plays and relevant texts) to think critically (Brookfield, 2003; McPeck, 1981; Onosko & Newmann, 1994; Willingham, 2008).

The vignette also illustrates that Sean’s students have been used to the routine of justifying their responses to the Literature texts with textual references. Although this routine cannot be strictly described as a thinking routine (Ritchhart, 2002), it does similarly encourage and support students' critical thinking in their task of having to justify their views of the Literature texts, albeit implicitly. This class routine is also consistent with Sean’s understandings of critical thinking as ‘analysis’ and ‘justification’ and the assessment objectives contained in the official literature syllabus. One of these objectives is that students should be able to ‘make an informed personal and critical response to texts and account for their responses’ (MOE, undated) during the examination.
In sum, the vignette of practice of Sean's lessons typifies the manner and extent to which critical thinking was implemented in his lessons. In terms of the criteria, some key elements were present. Although students were largely not active participants during lessons and thus minimised dialogical exchanges, challenging questions were consistently raised to engage students critically and they were also given an appropriate amount of time to think. Moreover, during the presentations of their essay, students offered explanations and reasons for their views and conclusions. Thus, on the whole, Sean's general pedagogical approach can be described to be closer to being dialectic (Paul, 1995) in nature, rather than didactic.

**Classroom thoughtfulness and cultural forces in Roy's lessons**

**Vignette of practice 2: an excerpt of Roy's lesson on fractions**

It's just past eight in the morning and Roy's class of forty primary school students, which he describes as the 'weak class', began to settle for their first lesson of the day in their airy and bright classroom. A song on grammar rules pinned on the notice boards at the back of the room suggested what students should draw their attention to and how they might best learn these things — through song.

*The sign that thinking was not a key aspect of learning was conspicuous by its physical absence; there were no posters or pin-ups which showed that thinking was valued among students in the same manner grammar rules were.*

Delayed by administrative matters that needed his attention, Roy began his lessons by recapitulating what was done in the previous lesson. As he told his students to get ready for the day's lessons, an air of acquiescence descended on the classroom. 'Be quiet', he reminded them in a stern voice as he began writing a number of math problems on the whiteboard. Instructing his students to attempt them he said, 'If you remember the concepts, they should be easy.'

*Roy explicitly conveyed expectations for student learning by recapitulating the previous lesson but not explicitly for students' thinking. However, in stating that 'remembering' was key in doing the Maths problems, he emphasized the lower-order thinking that was expected in the lesson.*

The students began to work on the problems in earnest as Roy walked around the class and selected four students to solve them on the board. The students, excited by the opportunity presented to them, immediately rose from their seats and worked on the problems written on the board. When all four had finished, he chose four more students to assess what their classmates had just completed. As a sign that their classmates' written answers to the problems were assessed as correct, the four students duly marked them with broad ticks of approval.

*Roy allowed an appropriate amount of time for students to solve the math problems and prompted them to recall the mathematical concepts they had learnt previously. By getting students to share their answers and for the other students to assess them, he encouraged students' participation in the lesson.*
In assessing his students' understanding of the process of arriving at the answer to the problems, Roy asked the class, 'Who can tell me what's the first thing I must do?' as he pointed to one of the problems. A few hands go up and a student answered, 'To count the denominator.' Acknowledging her correct answer, he then elicited all the other necessary steps and explained them systematically to the class. Stressing the importance of understanding the right methods, Roy emphasized, 'Once you know the procedures, you'll get it correct.' As he drew the lesson to a close shortly after, he asked repeatedly, 'Any questions?' to which no student responded.

Roy's questions were aimed more at assessing students' understanding and recall of the steps required to solve the math problems. Being closed procedural questions, they did not particularly encourage students' critical thinking but drew on lower-order thinking skills such as remembering of information. Students were also not observed to ask questions and thus did not assume the role of questioner and critic, minimising classroom dialogue among themselves and with the teacher. As such, Roy dominated much of the lesson's proceedings.

The vignette of Roy's practice mirrors his personal understandings of critical thinking: 'When I talk about thinking, it's about them thinking through their answers logically ... then based on what they think, they provide me with the answers'. He accorded more importance to his students' ability to think through logically and being aware of their thought processes in arriving at answers, or the metacognitive aspect which is a form of higher-order thinking (Beyer, 1997; Marzano, 1988; Paul, 1995), and thus focused on the process of arriving at answers rather than the answers themselves. However, consistent with this personal focus, the questions he raised were primarily aimed at probing students' understanding and lower-order thinking skills such as remembering (Anderson et al., 2001). In the Mathematics lesson observed, the aim was the understanding of mathematical steps and procedures. Roy who accorded more importance on the 'process rather than the product' in learning was not entirely satisfied merely with the correct answers.

However, as the vignette illustrates, the questions that Roy raised in this lesson typify those that he raised in other lessons with the class — those aimed at probing students' understanding of steps and concepts more than questions that sought them to justify their reasons and assess their assumptions. Nonetheless, such questions characterise verification questions (Costa, 2001c) which do not provide opportunities for students'
critical thinking or extend classroom dialogical exchanges with the teacher or among students.

In an English lesson observed, Roy’s range of questions was limited by the lesson objectives such as spelling and understanding the use of tenses and verbs. He was observed asking his students to give examples of verbs and pressed them with questions that assessed their understanding of them such as ‘How do you know it’s an action word?’ His lessons were also largely dominated by teacher talk as questions that were raised were limited to the assessment of students’ understanding of content such as ‘Can you give me an example of a verb?’. Again, these questions primarily drew on the lower-order thinking skills such as remembering and applying (Anderson et al., 2001) instead of engaging higher-order critical thinking skills.

Likewise, Roy’s English assignments indicated that the range of questions and tasks were primarily centred on understanding and recall of grammar rules and vocabulary. Examples of questions include those that assessed students’ appropriate use of prepositions such as ‘by’, ‘with’ and ‘of’ in sentences. This is not unexpected given that the approach to teaching English language in the Singaporean context is largely concerned with the development of students’ functional literacy rather than critical literacy (Koh, 2002). Curriculum documents also suggest that it is students’ reading, writing and oral proficiency in English rather than criticality which are the pedagogical foci (MOE, 2001).

While ‘spoon-feeding’ he admitted still takes place in his lessons, Roy remarked that this was not done on a ‘regular basis’. The questions he asked in lessons, as shown in the vignette, reflected the importance he accorded to assessing his students’ ‘thinking’ and cognitive processes. ‘To me, it is about questioning and generating answers from pupils. It is about their thinking that I am concerned.’ Thus, Roy believed that ‘time spent on critical thinking is valuable’ and said, ‘Just maybe with five minutes, you can generate like fifteen minutes [worth] of teaching.’ Despite these remarks, his questions indicate that he lacks the pedagogical understanding of questions that elicit critical thinking and those that do not such as the closed verification
questions that centred on remembering (Anderson et al., 2001) which were frequently observed in his lessons.

Although it was not observed, Roy claimed that at other times, he modifies his approach to 'generate' students' thinking.

Sometimes, [to get students to think] in different ways, I put them in different groups and sometimes, I just put the questions up on the board just to get them to generate ideas. The way they discuss and think ... allows me to give them more questions.

Apart from implementing critical thinking through questioning in class, he also believes in the importance of creating a classroom environment that is conducive to learning (Beyer, 1997; Costa, 2001c; Ritchhart, 2002; Tishman et al., 1995); one which is 'non-threatening ... where students will not be afraid to speak what they have in mind and also to allow room for mistakes'. This is an essential ingredient in nurturing and encouraging critical thinking in the classroom (Beyer, 1997; Costa, 2001c; Ritchhart, 2002; Tishman et al., 1995) and although Roy is seen as a disciplinarian given his post of Discipline Master in school, the observation of his students responding freely to most of his questions in class indicated they were not inhibited or afraid.

Thus, Roy's approach to pedagogy is based on teaching students 'how to go about getting answers rather than to give me the correct answer' and it is in such a pedagogy that he saw a dimension of critical thinking being enacted. Although it was not observed, Roy felt that, sometimes, 'where critical thinking is concerned — the way students think', he sees himself 'more of a facilitator, more of a person that provides thinking guidance', echoing the notion of a ‘thinking coach’ (Golding, 2006b). He elaborated that in the role of 'facilitator', his task is 'to see if students are doing things correctly, to provide assistance for pupils who are lost and to ensure there is participation from everybody'.

While Roy had an implicit idea of what he intended to achieve with his students when he incorporated critical thinking, he did not think he had any explicit intellectual criteria or standard to assess the quality of students'
thinking (Bailin et al., 1999; Paul, 1995). Instead, he described that the manner in which he judged his students' quality of thinking and thought processes was 'instinctive' and 'subconscious', echoing Sean.

In sum, Roy's lessons demonstrate few elements of the observation criteria used. His interviews and lesson observations suggest that while Roy recognised the importance of incorporating critical thinking, he perceived its implementation primarily in the shape of his focus on his students' cognitive processes in arriving at answers and in his questioning to ascertain the way his students thought. Raising engaging questions beyond those that assess students' understanding and encouraging students to assume the role of critic and questioner, for instance, are not part of his understandings of what it means to implement critical thinking in the classroom. This is also illustrated in his largely didactic approach to instruction which he felt was also a means of classroom management.

**Classroom thoughtfulness and cultural forces in Nathan's lessons**

**Vignette of practice 3: an excerpt of Nathan’s comprehension lesson**

Nathan's class of thirty graduating students gave their customary morning greeting as he began his English comprehension lesson for the day. Like the other classes in the school, the students are allocated with a 'permanent' classroom for all their lessons. Apart from a list of roster duties and other class administrative matters that stamped a sense of class ownership and identity, the boards around the spacious classroom lay bare.

The importance and value of critical thinking was not manifested in the physical environment. For instance, there were no posters that neither illustrated the value of thinking in the class nor encouraged it.

The lesson began with Nathan recapitulating a discussion in a previous lesson on a newspaper article about a school principal advising her students to pursue technical education. 'Why did the principal advise her students to go to the Institute of Technical Education?' he asked the students. His attempt at gauging their understanding of the article drew little response. In sensing that he had to proceed with his lesson, Nathan went on to explain what the article was about and explained why the principal had advised her students to pursue technical education. In doing so, Nathan took the opportunity to introduce new words and explained their meanings as his students listened intently.

In recapping the previous lesson, Nathan conveyed the expectation of students' learning in the lesson but not for students' thinking. His question was clearly aimed at assessing students' understanding rather than challenging them intellectually. Nonetheless, he provided appropriate time for students to prepare their responses. But the lack of students' engagement with his questions meant that he had to direct and dominate discussion rather than facilitate student participation.
Wrapping up the discussion, Nathan then proceeded to the lesson’s main agenda — the writing of topic sentences. As he went round to check their earlier work, he appeared a little dismayed by some students’ inability to distinguish topic sentences from titles. He then selected some students to share their answers to questions from the worksheet and chose three of them to write their answers on the whiteboard. ‘Jenny, Matthew and Eddie, can you write your topic sentences on the board so that we can evaluate them?’ he said.

Just as the students completed writing their answers on the board, Nathan turned his attention to the class. ‘Can you all analyse their answers? See how broad or narrow their topic sentences are and see if the grammar used is correct.’ Shortly after the students had discussed these aspects among themselves, he asked one of his students to share her opinion with the rest. ‘Linda, what do you think? Which topic sentence do you like best?’ Linda rose from her seat and offered her thoughts at which Nathan acknowledged, ‘Good.’

Nathan’s structured task challenges students’ understanding of topic sentences. In using the words ‘evaluate’ and ‘analyse’, he drew on the language of thinking although it was not clear if his students understood what each cognitive process meant. He engaged students by seeking their opinion and provided some time for them to think about their responses. However, he did not press for justification of students’ responses.

Nathan continued with his assessment of the students’ answers on the board and proceeded to explain how topic sentences can be used in an essay. Then, he instructed his students about the set task: ‘Alright, now in your pairs, discuss and write the topic sentences for the essay ‘Qualities of a good student’.

Apart from the earlier questions raised, Nathan was more focussed on content delivery of the lesson — topic sentences — and took a teacher-centred approach. No further questions were posed that engaged students to think about the nature and purpose of topic sentences. Instead, his approach was largely didactic with minimal student participation. Although the class task ensured they practised topic sentences, there was little to challenge students intellectually.

As the students began to discuss the essay question, Nathan went round the room participating in some of their discussions as a few students conversed in their favoured medium of communication — Mandarin. As the time for discussion ended, Nathan selected a pair to share their topic sentences. As he listened to them, he wrote the topic sentences on the board for the rest of the class to see. In appraising their topic sentences, he pointed out a number of mistakes and suggested improvements that can be made as the students looked on. Shortly after the bell sounded, he drew his lesson to a close. ‘Alright, class. Finish writing your topic sentences and essay as homework’, he told them as the class was dismissed.
Nathan provided the opportunity for student-student interaction in the shape of group discussions. Although students shared their topic sentences when asked, he continued with the didactic approach. Nathan used students' answers to instruct them further about topic sentences. There was little room for questioning students and students had few opportunities to assume the role of critic and questioner, thus minimising classroom dialogue.

The vignette of Nathan's practice typifies his other observed lessons. It suggests that his questioning was frequently intended to assess students' understanding of content. Furthermore, his lessons which were dominated by teacher talk, despite the occasional Socratic question that elicited students' responses, characterised a more didactic style. This style is inconsistent with both the pedagogical aims of TSLN in which a dialogical approach to teaching is essential in developing students' critical thinking (Alexander, 2008; Paul, 1995; Wegerif, 2007) and his recognition of the merits of developing critical thinking in learners.

However, Nathan explained that asking questions in class is also seen as an attempt to engage other students, which is an element of thoughtful classrooms (Onosko & Newman, 1990). Such questions compel students to 'evaluate' and 'synthesise' (Bloom, 1956; Anderson et al. 2001) and include 'Do you think this is the best answer?' and 'What would be your point of view?'. Nevertheless, he explained that such questions are 'more suitable in a context where you don't have the right answer' because 'if there's a fixed answer, it's quite difficult' to elicit students' alternative views and perspectives on an issue. Nathan reasoned that using such questions will be 'easier' 'in a context where you can have varying answers', or where an issue in question is 'multilogical' (Paul, 1995). This is in contrast to a 'monological' issue or question for which there is only one definite answer and perspective (Paul, 1995). Yet, Nathan's lessons that predominantly aimed at covering content and preparing students for examinations did not afford 'thoughtful' or 'powerful' questions (Costa, 2001c) as the vignette and other lesson observations indicate.

Nevertheless, questions in writing tasks and work samples suggest that Nathan's students did engage in critical thinking. Questions such as 'What
are some of the problems faced by teens in your country?' and 'What are the qualities of a good teacher?' in class essay assignments, for instance, are open and 'multilogical' (Paul, 1995) and require students to make judgements. However, Nathan’s feedback for students’ work suggests that the skills and quality of reasoning and justification were not a focus of the task as the main emphasis was purely on the development of students’ functional literacy. Thus, these expository writing tasks do not particularly develop or challenge students’ critical thinking skills such as justification and reasoning (Anderson, et al., 2001; Facione & Facione, 2006; Ennis, 1990; Paul, 1995), as opposed to discursive and argumentative essays which do so.

As such, while the English language syllabus aims for students to perform a number of critical thinking processes such as

- listen to, read and view with understanding, accuracy and critical appreciation, a wide range of fiction and non-fiction texts from print, non-print and electronic sources; and

- think through, interpret and evaluate fiction and non-fiction texts from print and electronic sources to analyse how language is used to evoke responses and construct meaning; how information is presented; and how different modes of presentation create impact (MOE, 2001, p.3; emphasis added),

it cannot be described that these skills were being developed or given explicit attention. Neither Nathan’s lesson observations nor his interviews suggest that the development of the skills is a distinct pedagogical focus.

Although Nathan saw that it is of primary importance that his students acquire an intellectual standard to judge the quality of thinking — theirs and their peers — he did not deliberately attempt to teach his students this skill.

[it’s] not quite conscious when I plan or execute lessons in the classroom. I suppose ideally, I want my students to be able to think and rationalise any idea even if I feel it’s the 'right' idea instead of merely adopting it. However, I don’t consciously set about to
inculcate this standard. But, I do question their rationale when they make certain choices.

Thus, the vignette of Nathan’s practice, consistent with the rest of his observed lessons, generally suggests that the development of intellectual standards is also not something that he approaches consciously and deliberately attends to, supporting his interview responses. Despite the few elements of classroom thoughtfulness that were observed in his lessons, Nathan recognises the merits of infusing critical thinking. He describes developing ‘critical thinkers [as] something I consider desirable’ and sees himself incorporating critical thinking during his lessons through the use of ‘very simple question techniques’, as illustrated in the vignette of practice.

Yet, based on Nathan’s lesson observations and his interviews, there is an inconsistency between his beliefs and pedagogical practices or actions (De Jong et al., 1995; Korthagen et al., 1994; Onosko, 1990; Raymond, 2008). While Nathan clearly believes in the importance and value of developing students’ critical thinking, such beliefs were not manifested in the classroom practices observed. This could be attributed to his pragmatic focus on the preparation of students for examination, rather than the pedagogical ideal in relation to critical thinking which he harboured in the shape of his beliefs about its merits.

**Classroom thoughtfulness and cultural forces in Yvonne’s lessons**

**Vignette of practice 4: an excerpt of Yvonne’s grammar lesson**

Having been delayed in a previous Art class, Yvonne’s students belatedly arrive for her English lesson. The classroom just about accommodated her 42 students and next to the class time table and duty roster, the walls of the room lay rather bare. As the students found their seats and readied themselves, Yvonne began her English class by recapitulating her last lesson on articles. ‘When would you use ‘a’, ‘an’ and ‘the?’ she asked her class through her portable voice magnifier that was clipped around her waist. As Yvonne acknowledged the responses of some students who excitedly shared them, she began to explain how the articles belong to the class of determiners.

*The importance of thinking is not manifested in the physical environment, for example, in the shape of posters. In recapitulating the previous lesson and continuing the topic, Yvonne conveyed her expectations of students’ learning, but little by way of students’ thinking in the lesson.*
Yvonne then asked, 'What does the word 'determine' in 'determiners' mean?' A few students shouted out their answers as Yvonne gladly acknowledged them and explained the differences between definite and indefinite articles 'the' and 'a'. Moving the discussion to the next category of determiners, she questioned, 'Who can guess which category of determiners the words 'this', 'that', 'those' and 'these' belong to?' The class quickly erupted into unruly excitement as some among them blurted out their guesses. But only when the din subsided shortly after could Yvonne then begin to properly elicit some of the students' responses. 'They are demonstrable determiners', one of her students cried. Yvonne acknowledged the right answer and proceeded to the next category of determiners — quantifiers. As she listed the various types of quantifiers on the whiteboard, she explained when such determiners were used to the class as they listened attentively.

Yvonne encouraged students' participation through her questioning but her closed questions aimed at student recall and knowledge of the topic, providing her with a means to gauge their understanding of the topic being taught — determiners. Her teacher-centred and didactic approach was evident as she provided students with much information on the topic.

Yvonne then turned to assess her students' understanding of the articles that she had just explained to the class and began to write a number of sentences on the board. 'Why are certain articles appropriate in these sentences and others aren't?' she asked as she drew the class's attention to them. The absence of any significant response to her question prompted Yvonne to explain how some of the articles in her examples were used. At this point, she drew the students' attention to the mind-map she had been drawing on the board to illustrate the appropriateness of the different classes of determiners. 'Take note of how a mind-map can be useful when planning for your essays too. Alright, please take down the notes on articles I've written down here.'

Yvonne's closed questions again targeted students' understanding of determiners as she continued to provide information to her students in which they assumed little role in questioning. Her didactic approach limits active participation of students in their learning of the topic and classroom dialogue.

As the students scribbled down their notes, Yvonne distributed her worksheets on articles. Soon the class fell quiet as the students began to complete their assigned task in earnest. Ten minutes passed and at the sight of her students finishing their worksheet, Yvonne proceeded to discuss the answers with the class. She selected students to share their answers and wrote them on the board. 'What's the reason we don't put any article in sentence number six?' Yvonne asked. Some students were unsure why this was the case. 'That's because you don't place an article before a name. To do so would be ungrammatical and it would be a form of Singlish', she explained as some students seemed rather amused by the mention of Singlish.

Yvonne assigned a class task that assessed students' understanding of what that had just been taught and provided them with sufficient time. She encouraged students' participation by getting them to share their answers and pressed students for the justification of their answers. Although students did not actively respond, she explained to the class the justification.
At the end of her discussion of the worksheet, Yvonne told the class, 'Alright, now write a few lines of personal reflection on your worksheet. You can write what you think you have learnt and the difficulties you found in the lesson.' Shortly after they completed their personal reflections, the bell sounded. Before she dismissed them and left, Yvonne reminded the class of their homework on determiners.

Although there were limited opportunities for students to be engaged beyond the closed questions, getting them to write their personal reflections of the lesson provides a form of metacognitive reflection. This compelled them to think about their thinking during the lesson and provided them with the opportunity to reflect on their learning of the content covered.

* Singlish is a variety of colloquial English commonly spoken in Singapore.

The vignette of Yvonne’s practice reflects the significant absence of the key elements of classroom thoughtfulness and is consistent with her interview comments. When asked for instances of how she had incorporated critical thinking in her lessons, Yvonne remarked: 'I've not consciously applied it'. In part, she attributed this to the topics that she has been teaching her students. Since the beginning of the first semester, Yvonne explained that she has been working to ‘build on the foundation’ before moving on to ‘the higher level’. Being new secondary school students who ‘are just bridging primary six to secondary one’, Yvonne found that ‘at this stage’ it was just ‘too early’ to apply critical thinking in her lessons with the class.

The vignette of Yvonne’s practice, as with other lessons observed, generally suggests this. There is little evidence to suggest that critical thinking was indeed a ‘conscious’ and explicit aim behind her lessons. For much of the time, like Nathan, Yvonne was teaching in the ‘transmission mode’ and her lessons were very much ‘teacher-centred’ focusing on the delivery of content and the assessment of students’ understanding of the content.

Moreover, although Yvonne’s quiz style questions elicited student involvement, they were mostly closed questions (Costa, 2001c). In other lessons, similar closed questions, such as ‘Can you tell me the difference between using ‘few’ and ‘a few’? ’ were raised. The answers to these monological (Paul, 1995) questions have pre-determined answers and thus offer little opportunity for students’ critical thinking to be engaged (Black et al., 2004; Costa, 2001c). Thus, they merely aimed at assessing students’
understanding of the content being taught. In her interview, Yvonne revealed that most topics taught in her lessons, in this case a grammar lesson, offer little latitude to incorporate critical thinking. It seems that the nature of such topics restricts the possibilities of student critical engagement given its 'closed' nature in the shape of the topics' 'well-determined correct outcomes and models' (Black et al., 2004, p. 17) such as pre-set grammar conventions and rules.

The samples of Yvonne's students' classwork also indicate that the development of students' functional literacy, not their critical thinking, was the primary focus. For instance, questions from the students' writing task such as 'How do I love myself?' and 'How do I love others and the environment?' in themselves draw on their higher-order critical thinking skills in the completion of the tasks. But, similar to Nathan's practice, the nature of students' responses and Yvonne's written feedback of their work indicate that the focus on such tasks is primarily on students' functional literacy rather than their critical thinking. Her comments did not refer to the evident lack of reasoning and justification in students' responses, but instead focussed on the grammatical aspects of the writing exercise which were demonstrated by her corrections of student grammatical errors. Moreover, to a lesser degree, comments such as 'Great, you've truly shown love for yourself' illustrated Yvonne's other main focus on students' affective aspect behind the writing task.

However, in instructing her students to pen their afterthoughts on the lesson, Yvonne incorporated a metacognitive element, which is a dimension of critical thinking (Dewey, 1938; Paul, 1995). Although she did not make the importance of metacognition explicit, getting students to think about what they have learnt does provide a platform for the focus on students' thinking (Beyer, 1997; Costa, 2001b, 2001c; Marzano et, 1988).

When asked about the appropriate time for her to incorporate critical thinking in lessons, Yvonne remarked that it was only when she feels that her students have had the 'foundation' they need. This is when she feels that
students can do more ‘independent learning’ and thereby do more ‘analysis’, which is her conceptualisation of what constitutes critical thinking.

In sum, there were few elements of classroom thoughtfulness observed in Yvonne’s lessons. Although she occasionally encouraged students to elaborate their responses by asking ‘why’, based on all the observations, this was the exception rather than the norm. As she said, ‘I have not consciously applied [critical thinking in class].’ Yvonne’s generally teacher-centred pedagogy seems to have been predisposed by her aim of merely providing students with the ‘foundation’ in grammar rather than to develop their critical thinking by concurrently infusing it in the process of content delivery. As she admitted, incorporating critical thinking is not a conscious pedagogical aim. Thus, together, these elements manifested in lessons in which there is little evidence of the implementation of critical thinking.

Classroom thoughtfulness and cultural forces in Ivan’s lessons

Vignette of practice 5: an excerpt of Ivan’s English lesson

Ivan began his English lesson by asking students to recapitulate what they had learnt in the previous one on reading strategies. Aiming to assess students’ understanding of the strategies, he elicited their responses before beginning the lesson’s first activity. ‘Class, I want you to now read the passage you have just received. I’ll give you 10 minutes to do so,’ he said.

Ivan conveyed his expectations of students’ learning in the lesson through recapping what they had learnt in the previous one, but the expectation of students’ thinking is not made explicit. He, however, allowed adequate time for students to read the passage.

As the minutes passed, Ivan walked around the class, checking on the students’ progress. ‘OK, now get into your pairs and discuss how you can summarise the passage,’ he told the class as they finished reading. As a strategy to further engage students with the text, they were also told to discuss how the passage related to their own life experiences.

Ivan structured a class task that drew on the summarising strategies that students have been learning. It could be said that the summarising activity implicitly drew on certain higher-order thinking skills including synthesising as students summarised the main points of the passage. By grouping them into pairs to complete the task, he also encouraged student interaction and discussion.

When the students finished their discussions, Ivan proceeded to discuss the comprehension questions. ‘Mary, can you read the first question and tell us which key words in the question you highlighted?’ Ivan asked. As Mary read and shared with the class the key words she had highlighted, Ivan selected another student to comment on her answer. ‘Joe, do you agree or disagree with Mary and can you tell us why you agree or disagree?’ Joe responded, ‘I agree with her because the words
tell us what we should look out for when answering the question. Like the word, ‘how’ tells us to think of the way and ‘why’ tells us to think of the reasons.’ Ivan continued in a similar vein with the rest of the questions — getting students to share their answers and for their classmates to comment on them.

*Ivan assessed a student’s understanding of the question by asking her to share with the class the key words she highlighted. He did not press for justification of her selection but chose instead to engage other students by asking them to consider her answers and sought justification for their conclusion through Socratic questioning.*

Students’ answers and exchanges illustrated to Ivan that they had understood the passage reasonably well and the subsequent questions. ‘Good, class. You can write the answers to the questions as homework. Now, we shall move on to the next activity and continue our previous discussion of the article on terrorism.’ As the students retrieved their article and placed it on their table, Ivan asked, ‘What would you do if you found out that your neighbour was a terrorist?’ and cautioned the class, ‘Don’t jump to conclusions.’

*In continuing the previous discussion on terrorism, Ivan raised a challenging question. Knowing that the multilogical question evoked a moral dilemma, Ivan provided time for students to ponder over and prepare their responses.*

Students had varied responses. Some said, ‘I will report my neighbour to the police!’ while others responded, ‘I will meet and talk with him.’ Again, Ivan asked students to justify their opinions and engage with each other’s answers by asking questions such as ‘Why?’ and ‘Do you agree with what was just said?’ before moving on to discuss the next article on former Indonesian president Suharto.

*Ivan pressed for students’ justification of their opinions, giving them time to prepare their reasons and included other students in the discussion by encouraging them to assume the role of critic in appraising the opinions of their classmates, thereby making the discussion both dialectical and dialogical.*

Some students were quick to share their thoughts on the former president. ‘I think he was corrupt’, said one student when asked what the class had thought of him. ‘How do you know that? What evidence is there to show that he was corrupt?’ Ivan asked. More students shared their opinions, as Ivan prompted them with further questions throughout the lesson. Ivan explained further some of the issues that were surrounding Suharto, wrapping up the discussion before the lesson ended at the sound of the bell.

*Students were active participants of the discussion and were quick to voice their opinions. Ivan pressed individual students to justify their assertions in a Socratic method after considering their views. They seemed to enjoy such dialectical and dialogical exchanges with Ivan as they were made to elaborate and justify their various views.*

The vignette of Ivan’s lesson illustrates how he applied the questioning techniques he learnt from a professional development session. He remarked: ‘I must say after that effective questioning course, I am a bit more critical in my mind, thinking now before I actually pose the questions.’ Like Sean and
Evelyn, his questions encouraged student justification and evaluation of perspectives, which characterise Socratic questioning (Paul, 1995; Paul & Elder, 2007). Students were not only compelled to justify their assertions, but their classmates were encouraged to take on the role of a critic and engage both dialectically and dialogically (Paul, 1995) in classroom interactions.

In addition, Ivan's use of 'wait time' (Beyer, 1997; Brooks & Brooks; Black, Harrison et al., 2004; Costa, 2001c; Rowe, 1974, 1986) was illustrated when he gave his students the time to ponder over their responses to his questions. This, Ivan said, was one of the things he had learnt as part of the workshop.

Consistent with the literature (Beyer, 1997; Black et al., 2004; Lipman, 2003; Swartz, 2001), Ivan also believes this focus on peer questioning has great benefits for his students. Before such activities, Ivan usually provides his students with a 'foundation' of the lesson, its basic content and the context knowledge essential prior to the engagement of critical thinking (Beyer, 1997; Brookfield, 2003; Onosko & Newmann, 1994). Following this, Ivan then allows his students some liberty to explore content among themselves through peer questioning and interaction.

I am creating that kind of environment for them. So I think in a way, it should help the children when they are getting used to be being posed questions. But of course I will lay the foundation for that particular lesson and ... leave it to them to discuss among themselves. So that helps also.

Apart from the incorporation of questioning techniques, Ivan also tries to 'provide opportunities for pupils in the classroom to work in pairs and in groups', as illustrated in the vignette. He felt that cooperative learning strategies encourage students to raise questions among themselves: 'Inevitably, as they are working together, they will have to ask each other questions.' However, Paul (1995) warns that without the right skills being properly taught to students, such activities can lead to 'cooperative mis-learning', especially if students are not taught how to bring intellectual standards to judge the quality of their thinking and that of their peers as is the case with most of the teachers.
Ivan sees having an ‘intellectual standard’ to assess the quality of thinking (Bailin et al., 1999; Paul, 1995) in his students as being primarily important. His intuitive conception is based on the notion of ‘always try[ing] to see issues from different angles’. However, while Ivan believes that this is the case, as evidenced by his lesson observations, he neither consciously nor deliberately develops this, suggesting an inconsistency between his beliefs and his classroom practices (De Jong et al., 1995; Korthagen et al., 1994; Onosko, 1990; Raymond, 2008).

In sum, there were more distinct elements of classroom thoughtfulness observed in Ivan’s lessons than in Yvonne’s and Nathan’s lesson. Although the development of critical thinking was not a primary aim in his class, the nature and variety of his questions during lessons engaged students’ thinking and encouraged and extended classroom dialogue. His constant probing of students’ views compelled them to provide justifications for their assertions and he got students to participate in discussions by encouraging them to critique their classmates’ assertions, which parallels what Paul (1995) describes as both dialectical and dialogical. Thus, based on the observations of his lessons, his general pedagogical approach can be described to be more dialogical rather than didactic.

**Classroom thoughtfulness and cultural forces in Evelyn’s lessons**

**Vignette of practice 6: an excerpt of Evelyn’s General Paper lesson**

Today’s lesson is a continuation of the previous one in which Evelyn goes through the common mistakes made by her students in their GP essays. ‘OK, today we'll be discussing errors made in the first essay you wrote and then look at how to use supporting details in three types of essays’, she told the students as they settled in.

*In delineating the lesson objectives, Evelyn conveyed her expectations of students’ learning but does not explicitly state the expectations of their thinking.*

The class examined a paragraph of an essay flashed on the projector screen as Evelyn drew their attention to some words it contained. ‘What do you think can be done to temper the tone of absoluteness in this paragraph?’ she asked. A student answered, ‘You can add the word ‘can’ or ‘could’ to make your assertion less absolute’ and was promptly pressed for justification. ‘Why do you think so?’ she asked repeatedly as each student who responded paused and elaborated on his or her answer. Such questioning that sought justification aimed for the students to be more conscious of and deliberate with the choices they made in their writing.
Evelyn raised a challenging question that elicited responses. Although she pressed students for the justification of their assertions, she offered little wait time for them to prepare their answers.

Evelyn turned her attention to the claims made in the next paragraph. Aiming to raise her students' awareness to generalisations and taken-for-granted assumptions contained in it, she asked, 'What are the assumptions underlying the claim 'abortion is murder'? Does it imply that all abortions in all circumstances are tantamount to murder? What does abortion and murder mean here?' Every student response to the questions was probed further for the reasons as Evelyn asked 'why' at the end of each student's assertion.

Evelyn raised questions in a Socratic manner and her constant probing forced her students to think and rethink their answers. She continued pressing them for their explanation and justifications of their opinions.

The class then proceeded to discuss another essay as Evelyn told them to evaluate a paragraph from it. As the class thought about it, a student responded, 'I think some of the statements are not logical as their assumptions are also not logical.' Again, Evelyn prompted him to elaborate and justify his stance and only moved on when she was satisfied that he had thought through his answers.

By instructing students to evaluate the paragraph, she encouraged them to assume the role of critic. On this occasion, she provided more time for students to prepare their answers and pressed the student to explain and justify all his assertions.

Evelyn wrapped up the discussion and moved to the next segment of the lesson that focussed on how students can apply their knowledge of current affairs when writing on the different essay questions. In doing this, she began by explaining to the class how she would go about answering the essay question selected. Evelyn then gave the class their writing task for the lesson, providing them the opportunity to apply what they have been discussing. 'Alright, get into pairs now and then choose an essay question. Discuss some points you and your partner will write and what supporting details and examples you would use to back up your points,' she told the class.

Evelyn made her thinking visible as she explained how she thought through answering an essay question, modelling for students her thought processes through the different stages of essay writing. The task she structured allowed students to put into practice what had been discussed, giving her the opportunity to assess their learning.

As Evelyn called for time about 10 minutes later, student pairs she selected began to share some of the points they had been discussing. Once again, she constantly probed every claim her students made. Her constant push for justification made students reconsider their assertions. Again, her rigour compelled students to revise and rethink their claims more carefully. Before she ended the lesson at the sound of the bell, Evelyn showed her students a 'model' essay on her PowerPoint slides, drawing their attention to its qualities and merits. She also emphasized how they could go about modelling their own work using these examples.
Evelyn provided sufficient time for students to prepare their work and the opportunity for peer interaction. Although she consistently pressed students for the justifications of their assertions, Evelyn does not seem to be aware that her students were not always given sufficient time to respond to her probing.

The vignette of Evelyn’s practice characterises the types of questions she regularly employs in her classroom and other observed lessons — Socratic questions (Paul, 1995; Paul & Elder, 2007). Although her students rarely engaged her and their classmates with such questions, they were, nonetheless, aimed at compelling the students to seek reasons and justification for their responses. In this respect, such strategies manifest the key elements in the creation of thoughtful classrooms (Beyer, 1997, 2001; Ritchhart, 2002) or cultures of thinking (Ritchhart, 2002) despite Evelyn stating that developing students’ thinking is not an explicit and primary objective during lessons. However, although Socratic questions were raised, it was observed that Evelyn did not provide adequate wait time or ‘think time’ (Costa, 2001c), which is essential for facilitating students’ thinking (Beyer, 1997; Black et al., 2004; Rowe, 1974, 1986), for the majority of students. On these occasions, the lack of wait time offered compromised the full merit of her questions in engaging and developing students’ critical thinking.

While it was not observed, Evelyn remarked that she also ‘used Socratic questioning to teach students how to evaluate the claims made in the newspaper articles’ as part of their weekly class tasks. This routine which requires students to read daily newspapers was not only aimed at developing students’ ability to critique and evaluate the articles they encounter, but also helps them to stay informed of current affairs. With these aims, such class tasks also prepare students for the examination where the knowledge of current affairs and the ability to critically comment on issues are crucial aspects in excelling in the subject, General Paper (MOE, 2007). This is also where the importance of content knowledge is needed before students are able to think critically as suggested in the literature (Beyer, 1997; Brookfield, 2003; Costa, 2001b; Onosko, 1990; Willingham, 2008).
Evelyn also remarked that she tries to 'tweak' the way she poses questions in class according to the situations she finds herself in with her students while teaching, illustrating how her context knowledge (Nilsson, 2008) or knowledge of the learner (Shulman, 1987) impact her approach. As shown in the vignette and observed in other lessons, the ability of the class she teaches determines the questions she raises in class.

... for the brighter ones, I will question their assumptions and ask them to further clarify. So, I will use more clarifying questions, justification, elaboration, and so on. So, this will be affected in my question techniques.

Moreover, the instances in lessons in which Evelyn modelled her cognitive processes in planning and writing an essay for her students is consistent with the literature which suggests that such strategies of teacher modelling are useful in developing students' thinking (Tishman et al., 1995; Halpern, 2003; Ritchhart, 2002). Moreover, these also seem to have the useful effect of making the teacher's thinking visible to students (Ritchhart, 2002; Ritchhart & Perkins, 2008).

Although it was not observed, Evelyn remarked that she also uses mind-maps (Buzan, 2005) or concept maps (Novak, 1998), as one way to help students to organise their own thoughts on issues. She sees mind maps as another means of incorporating critical thinking as they help students 'to see the links between different issues and the different perspectives on those issues' (Hay & Kinchin, 2006) discussed in class. Such use of mind maps, she believes, helps students to consolidate their knowledge of issues and their different perspectives so that they are better able to articulate their own opinions in light of what they have learnt.

Evelyn also employs a technique she had learnt from a colleague's 'sharing' to encourage critical thinking. Working with students who are mostly reticent when it comes to articulating personal views, Evelyn described an instance when she had attempted to engage them to voice their opinions:
... there was one lecture where we wanted students to think about an issue first before we started. So we played a video and asked students to write their thoughts on what they saw on the video. So, we were trying to push the students' 'emotion buttons' or rather their five senses so that they will 'feel' for the issue and write their general thoughts about it.

Evelyn saw this as a useful way to engage students with current issues. She felt that engaging them initially with the issues on an emotional level provides a platform to progress the discussion on a more intellectual level. This is consistent with what some writers such as de Bono (1985) suggest. In his concept of the six thinking hats, the red thinking hat encourages one to look at his or her emotions and feelings behind an issue, or from the perspective of emotions, and is often used before addressing other hats.

Apart from incorporating critical thinking through her questioning of students in class, Evelyn also encourages her students to do 'self-reflection' on their work and samples of her students' classwork show evidence of this. Moreover, as part of her routine, Evelyn provides an 'essay checklist' which requires students to review their work and assess its strengths and weaknesses. Criteria in the checklist such as 'examining counter arguments' and 'including counter arguments' and 'having good examples', which pertain to the philosophical dimension of critical thinking (Facione, 1984; Lipman, 1988; Paul, 1995), are aimed at students assessing the quality of their essay and their thinking behind it.

To some extent, the routines in the shape of checklists can be considered to be part of her classroom culture. Manifesting the importance of the metacognitive aspect as espoused in the literature on thinking (Beyer, 1997; Marzano et al., 1988; Swartz, 2001; Tishman et al., 1995), Evelyn explained that checklists 'used a technique that emphasizes [the] metacognitive ability of the students' — done 'through the self evaluation of their work' and that of their peers. The use of checklists during essay writing encourages self and peer evaluation and thus promotes students' critical thinking (Black et al., 2004). They can also be seen to function as a form of intellectual standards
to assess both the quality of their own written work and thinking and that of their peers' (Bailin et al., 1999; Paul, 1995).

Evelyn also believes that peer evaluation moves her students away from having to seek 'prescriptive answers all the time' from her. In placing the onus on them to critique a peer's work and 'recommend' the ways in which the work can be improved, Evelyn encourages a form of student-initiated learning (Black et al., 2004). Consistent with constructivist pedagogies that is central to developing students' critical thinking (Costa, 2001c; Brooks & Brooks, 2001), this puts students, rather than the teacher, at the centre of the learning process and empowers them to take charge of their own learning.

In sum, a number of key elements of classroom thoughtfulness were observed in Evelyn's lessons. Although the development of critical thinking is not a primary aim in her class, like all teachers, the nature and variety of her questions during lessons engage students' critical thinking. Her constant probing of students' justifications of their assertions via Socratic questioning, especially, compels students to provide explanations and further elaborations. Such dialectical and dialogical (Paul, 1995) routines can be said to be part of her classroom culture. Furthermore, she is the only teacher that sees the implementation of critical thinking as being more than just about questions in class; metacognitive activities such as reflections and essay checklists are, in her view, a part of implementing critical thinking in the classroom.

Discussion

The findings in this section suggest that critical thinking is a secondary and an implicit and 'subconscious' instructional aim of teachers. Most of them do not explicitly incorporate critical thinking in their classroom as the development of thinking is subordinated to other aims such as content coverage. However, this does not mean that no forms of critical thinking, or attempts at it, were incorporated in lessons as the vignettes and lessons observations indicate. All teachers see questioning techniques as their primary means (and in most cases, their only means) of incorporating critical thinking in lessons in which such enactment is largely immersed in the
teaching of content and never made explicit. Figure 13 illustrates how the subthemes discussed inform the formulation of the major theme teachers’ knowledge base shapes teachers’ practice.

![Diagram showing the relationship between subthemes and the major theme]

**Figure 13: Teachers’ knowledge base shapes teachers’ practice: a thematic summary**

While all the teachers enacted some forms of critical thinking in the classroom in spite of the complexities that they had to grapple with, what is notable is that developing critical thinking was not seen as an explicit pedagogical aim of their lessons. Sean and Nathan, for instance, did not approach the designing of lessons in ‘those terms’ as other priorities took precedence. Nathan saw the coverage of content as being his primary responsibility and, likewise, Sean viewed preparing students for the examination and completion of the syllabus as the main concerns to which other issues were subservient. In practice, all the teachers’ main pedagogical objective is preparing students for high stake examinations such as the Primary School Leaving Examination (PSLE) at the end of primary school.
education, and the General Cambridge Examination (GCE) Ordinary and Advanced levels at the end of secondary and junior college education respectively.

Similarly, Roy, Yvonne and Ivan view the development of students’ critical thinking as a ‘subconscious’ aim. Critical thinking as a pedagogy is more of a subconscious manifestation during teaching rather than a result of deliberate planning. The teachers do not position the development of critical thinking as the central consideration in their pedagogical actions in the classroom; all stated that critical thinking is of secondary importance in their instructional objectives and their pedagogical decision-making.

Furthermore, the observed lessons suggest that teachers’ level of classroom thoughtfulness (Onosko & Newman, 1994) vary greatly. For example, the vignettes of practice illustrate that Evelyn and Sean raised challenging questions during their lessons, pressing students to assess their underlying assumptions and provide justifications for their responses. Their enactment of critical thinking seems to be profoundly influenced by their respective intuitive and disciplined based understandings of what critical thinking constitutes and the demands of the subject that they were teaching — General Paper and English Literature. That is, their enactment appears to be predisposed, more specifically, by their CTK and curricular knowledge.

However, while Evelyn’s and Sean’s questions during their lessons clearly require their students to analyse and evaluate their positions, only a few students assumed the role of questioner and critic, and engaged in thoughtful discourse with each other as the majority of them remained passive listeners. Apart from teacher questioning, students’ ability to generate questions is seen as integral in the development of thinking in classrooms (Beyer, 1997; Brooks & Brooks, 2001; Ellsworth & Sindt, 1994; Perkins, Swartz, 2001) and encouraging students to raise their own questions can be a source of generation of thoughtful questions that provide further opportunities for thinking in the classroom (Beyer, 1998). Consequently, the dearth of student questioning contributes to the general lack of dialogical exchanges between teacher and students, which writers such as Alexander (2008), Wegerif (2007)
and Paul (1995) stress are also key in the development of students' critical thinking.

In contrast, Roy and Ivan see classroom questioning as a means to assess student thought processes and encourage student reflections respectively. Their questioning technique knowledge, which is developed through both professional development and experience, clearly plays a pivotal role in their lessons in which their CTPK (critical thinking pedagogical knowledge) is seen to be enacted into practice.

In the cases of Nathan and Yvonne, however, questions raised were intended to assess students' understanding of content rather than to provoke thinking in students. Thus, they incorporated fewer elements of classroom thoughtfulness compared to Evelyn and Sean. But, as Yvonne and Nathan suggested, this can be attributed to the nature of the topics and content taught; spelling and comprehension activities do not easily allow critical thinking to be incorporated given that the nature of these tasks are not multilogical (Paul, 1995) and 'open' to divergent responses (Black et al., 2004). Instead, having 'well-defined outcomes' in such tasks limits 'alternative conceptions' and opportunities for open discussions (Black et al., 2004, p. 17).

Consequently, for Nathan and Yvonne and their students, these factors meant there was little opportunity for them to 'make thinking visible' (Perkins, 2007) in the classroom. The language of thinking and thoughtful and 'powerful questions' (Capdevielle, 2003), which is a significant means of making thinking visible in the classroom (Perkins, 2007), were largely absent and collectively, their absence contributed to the lack of classroom thoughtfulness in Nathan's and Yvonne's observed lessons.

The indication that critical thinking has a peripheral and subconscious role in the daily classroom of teachers raises some problematic implications in terms of the prerequisites of creating a thinking classroom to which TSLN aspires. Costa (2001c) writes that 'structuring the classroom for thinking should be conscious, deliberate, clear and based on the desired outcomes for students' (p. 363; emphasis added). In the case of the teacher participants, it cannot
be said that their classrooms are consciously and deliberately structured for critical thinking because other priorities, such as content coverage, take centre stage.

Despite this, there were elements observed which indicate some level of critical thinking implementation during the teachers' lessons. The questioning which took place in all the classrooms indicates that some forms of critical thinking implementation, either deliberate, 'intuitive' or 'impromptu' occurs.

Questions that the teachers were observed to raise during their lessons can be categorised in a number of ways. Ivan's, Evelyn's and Sean's questions that press for justification and alternative perspectives parallel Socratic questions. Paul and Elder (2007) state that 'Socratic questioning is intimately connected with critical thinking because the art of questioning is important to excellence of thought' (p. 36), while other writers (e.g. Costa, 2001c; Perkins, 2007; Tishman, Perkins & Jay, 1995; Lipman, 1985; Paul, 1995; Morgan & Sexton, 2006; Swartz, 2001) stress the importance of questioning as a way to develop critical thinking. And in the creation of thoughtful classrooms (Beyer, 1997) and a culture of thinking (Ritchhart, 2002; Ritchhart & Perkins, 2008) which both consequently aid students' learning (Black et al., 2004), Socratic questions play a crucial role.

In contrast, questions that dominated during Nathan's, Roy's and Yvonne's lessons are mostly what Costa (2001c) describes as verification and closed questions. In their cases, these are primarily aimed at assessing students' content understanding. In contrast, 'powerful questions evoke in students an awareness of and engagement in the mind' (Costa, 2001c, p. 360) and are 'invitational', cognitively engaging and relevant to the learner.

Based on the aforementioned features, most questions observed in Nathan's, Roy's and Yvonne's lessons cannot be described as being 'powerful questions' in the same way that Socratic questioning (Paul, 1995; Paul & Elder, 2007) can. Therefore, in enacting what teachers perceive as critical thinking through their questioning of students during lessons, teacher engagement of students with critical thinking is largely limited to the cognitive
dimension. That is, teachers' enactment of critical thinking is mostly limited to questions that require students to draw on Bloom's cognitive processes (Bloom, 1956), such as analysing and evaluating deemed higher-order thinking (Anderson et al. 2001; Paul, 1995) and even lower-order thinking skills such as remembering (Anderson et al. 2001).

These strategies, as suggested, stem from teachers' conceptualisation of critical thinking that is largely limited to a skills dimension (e.g. to analyse and to evaluate) — a conceptualisation that can be considered as a more generic or global understanding of critical thinking (Presseisen, 2001). They are in contrast to the deeper understandings of critical thinking as suggested by Wegerif (2007) and Paul (1995) who see the teaching of thinking as fundamentally dialogical, as discussed in Chapter 2. Teachers' partial understanding of critical thinking could explain why they do not attend to the development of the other aspects of critical thinking in the classroom. Furthermore, given that a more expansive understanding of critical thinking is not part of teachers' conceptions of critical thinking, teachers such as Roy, as shown earlier, understandably mistake critical thinking questions as those that also draw on lower order cognitive skills (Anderson et al., 2001).

The findings here are also consistent with Ritchhart's (2002) study of teaching thinking. He found that teachers with well-developed understandings of thinking were more proficient in incorporating strategies that develop students' thinking than those who had more global conceptions of thinking. Similarly, in terms of the quality of teachers' questions, it has been observed that this is dependent on teachers' content knowledge and PCK (Black et al., 2004) too. And I would add that the quality of teachers' questions is also influenced by the richness of their CTPCK (critical thinking pedagogical content knowledge) and its related knowledge categories (e.g. CTK (critical thinking knowledge) and CTPK (critical thinking pedagogical knowledge).

While the teachers expressed the importance of their students having intellectual standards (Paul, 1995), or the criteria to assess the quality of thinking (Ballin et al., 1999) as defined previously, none of them could be said to develop deliberately these in students beyond the provision of checklists in
essay writing as in the case of Evelyn. As such, while teachers incorporated varying levels of critical thinking in their lessons, namely through the engagement of students' cognitive processes via questioning alone, there appears to be a danger of 'pseudo critical thinking' occurring. In this regard, Paul (1995) cautions:

If an approach to teaching of thinking focuses on the use of mental processes without a critical application of standards to that use, and persuades many to do the same, then it is an example of pseudo critical thinking. (p. 55)

Paul (1995) also adds ominously, 'there can be no critical thinking without the use of intellectual standards' (p. 55). Being taught these standards is also key in the use of cooperative learning strategies as a means of cultivating critical thinking, which some teachers, such as Roy and Ivan, perceive as their means of incorporating critical thinking. To avoid 'cooperative mislearning', Paul (1995) stresses the need for students to 'learn how to bring intellectual standards into their work, how to hold themselves and their classmates to standards of good reasoning and analysis' (p. 299). Therefore, if students have not been explicitly taught to do so in judging the quality of their thinking and those of their peers, as teacher interviews and lesson observations suggest, then cooperative learning strategies which are perceived to be the vehicle to foster the development of critical thinking can be misguided.

In light of TSLN aspirations of not only developing thinking skills but thinking dispositions in learners, it could be said that teachers’ implementation of critical thinking in their daily teaching is relatively unstructured and limited. However, I argue that the fulfilment of TSLN aspirations entails the incorporation of thinking that is systematic and holistic. That is, it requires:

- the systematic and deliberate creation of thinking classrooms, thoughtful classrooms, or cultures of thinking (Beyer, 1997; Costa, 2001c; Ritchhart, 2002; Tishman et al., 1995);
that the characterological and cognitive dimensions of thinking are attended to (Costa, 2001a; Ritchhart, 2002; Paul, 1995; Tishman et al., 1995); and

- the 'enculturation' of thinking (Tishman et al. 1995) does not stop at the creation of positive and non-threatening environments for student learning (which teachers in the study recognised).

These requirements call for the creation of a 'climate of thinking' (Costa, 1985) or a culture of thinking (Ritchhart, 2002), which is largely absent in the teachers' classrooms observed.

Although the majority of teachers' lessons observed incorporated elements of thinking, predominantly in the form of questioning, the incorporation of thinking did not go far beyond this cognitive dimension to a holistic enculturation of thinking. For instance, this would involve the physical environment in the shape of posters and pin ups that value thinking and students' learning; the regular use of the language of thinking and the development of thinking dispositions such as through teacher modelling and feedback (Beyer, 1997; Ritchhart, 2002; Tishman et al., 1995). It is the creation of cultural forces such as these which promote thoughtfulness in classrooms and engender a distinct culture of thinking (Ritchhart, 2002). In this regard, Perkins (2007) reminds educators of the importance of 'making thinking visible'.

We don't notice how easily thinking can stay out of sight, because we are used to it being that way. As educators, our first task is perhaps to see the absence, to hear the silence, to notice what is not there. (p. 6)

Furthermore, a holistic approach to the development of students' thinking as some argue involves more than just the teaching with thinking; it should incorporate the teaching for, of and about thinking (Beyer, 2001; Costa, 2001b; Halpern, 2003; Tishman et al. 1995) in which its teaching is made explicit. But as interviews and classroom observations indicate, teachers
have largely not taken up these approaches owing to their lack of an adequately developed knowledge base of critical thinking.

The discussion of teachers' engagement with critical thinking, as stressed from the outset, is more of a critique rather than a criticism of their practice per se. Given that critical thinking is neither a concept nor an aim that was in the regular pedagogical considerations of the teachers, it is unsurprising that most of them were unable to incorporate critical thinking beyond the boundaries of 'questioning techniques' and cooperative learning strategies. Moreover, questioning and cooperative learning strategies used appear to have been drawn from teachers' prevailing pedagogical knowledge and PCK domains. However, as suggested, teaching thinking effectively requires CTPCK, which is a special form of knowledge that not only comprises, but entails more than PCK and its related categories. In other words, for teachers to teach critical thinking effectively, they need to have adequate declarative, procedural and conditional knowledge of critical thinking to be integrated into their PCK, forming their CTPCK. This will ultimately allow them to not only have a more complete understanding of critical thinking, but also equip them with the relevant knowledge base to implement critical thinking more effectively.

Thus, I suggest that the limited implementation of critical thinking in the daily classroom indicated in this section can be attributed to the gaps and uncertainties in teachers' knowledge base of critical thinking. This is supported by what teachers candidly shared. Nathan affirmed this, remarking that 'there are a lot of things about critical thinking I am not sure about' and 'there are a lot of things that we do that would be critical thinking but we don't know it's critical thinking'. Similarly, in reference to her incorporation of critical thinking, Yvonne pointed to the lack of a knowledge base as being a barrier to implementation:

I guess also the knowledge of how to apply it [i.e. CTPK] because if I don't know how to, I won't [incorporate critical thinking in my lessons]. I feel I don't have a strong knowledge and foundation of
critical thinking [i.e. CTK]. That's why I realized I don't really apply it or I don't apply it consciously throughout lessons.

This finding also echoes Retna's (2007) study of a Singaporean school's journey as a learning organisation. She found that while teachers in her study held positive attitudes towards teaching critical thinking, these were not always manifested into corresponding classroom actions given their 'lack of knowledge of creative strategies for nurturing critical and creative thinking' (p. 138), or what I argue as being indicative of the lack of CTPCK.

As previously suggested, the lack of responsiveness to TSLN's emphasis on critical thinking may be attributed to the teachers' gaps and uncertainties in their knowledge base of critical thinking. This parallels the findings of other studies that suggest the incongruence between teacher beliefs and teacher actions is due to the lack of knowledge in a domain or subject matter (Brickhouse 1990; De Jong et al., 1998). In addition, the lack of adequate knowledge leads teachers to teach in a more didactic manner (Shulman, 2008) in which classroom dialogue then becomes teacher dominated, as shown in the cases of some of the teachers (e.g. Roy, Nathan and Yvonne). The teacher-centred approach taken by them is also consistent with observations of Singaporean primary and secondary schools which illustrate that classroom activities and talk are overwhelmingly dominated by teachers (Paris, 2009) who in effect minimalise active student participation and classroom dialogue.

Teacher knowledge, beliefs or conceptions have a great propensity to influence the manner in which teachers approach their pedagogy and curriculum implementation (Wilson, Readence & Konopak, 2002; Flores, 2001; Pajares, 1992). Moreover, teachers expressed that professional development and teacher education did little to develop their knowledge base of critical thinking and that, in practice, the teaching of critical thinking is very much left to them individually.

However, it must be recognised that teachers are embroiled in and influenced by the contexts in which they practise (Barnett & Hodson, 2000; Clark & Peterson, 1990; Lampert, 1990; Fullan, 2001; Hargreaves, 1999). Just as
there are factors that influence teachers' knowledge base in the context of critical thinking, there are also factors that appear to exacerbate teachers' pedagogical decision-making and the extent to which teachers implement critical thinking. The next section examines other significant factors that teachers perceive to have shaped their implementation of critical thinking.
PART II

CONTEXTUAL AND SYSTEMIC FACTORS SHAPE TEACHERS’ PRACTICE

Introduction

Following the discussion of the theme teachers’ knowledge base shapes teachers’ practice in Part I, Part II of the chapter examines the external factors that shape the manner and extent of teachers’ implementation of critical thinking. Data from teacher interviews and lesson observations, where relevant, were used to examine the factors that teachers perceive shape their implementation of critical thinking. Following the analyses, the broad theme contextual and systemic factors shape teachers’ practice was identified. It encapsulates the subthemes which include the significant factors that impact teachers’ decisions to incorporate critical thinking in their teaching.

‘You really cut down on the thinking’: the tyranny of time, mandated examinations and curriculum hegemony

A common subtheme that emerged from the analysis of teacher interviews regarding the situational factors that impact the implementation of critical thinking is the need to cover content and prepare students for examinations; this need is exacerbated by the lack of time — a constant factor regardless of the grade level teachers taught. Paradoxically, the curriculum under TSLN that is intended to be the vehicle to develop thinking (Goh, 1997; Ho & Gopinathan, 1999) is also cited as the barrier to the development of students’ thinking.

Sean claimed that his preferred pedagogical approach in trying to get students to formulate independent reasoned opinions and perspectives on issues — which, in effect, attempts to develop students’ critical thinking — is compromised by both syllabus and examination demands. These consequently resulted in students opting for ‘received opinions’ over formulating their own, thus, failing his initial aim and affecting his pedagogical
approach. Sean attributed this barrier to ‘the constraints of the syllabus’ because ‘the bottom-line will come down to that’.

Sean also saw other constraints such as time and the need to finish the syllabus and exam preparation. With exam preparation a constant focus, he felt that his students also needed to work on writing skills. As such, much of his lesson time is used to develop students’ examination skills instead of developing their ability to engage critically with ideas. He explained:

... exam writing skills are very important for them. So a lot of my time is spent on looking at presentation of ideas and whether they are substantiating, how they are quoting, whether they can push some ideas. With that ... there’s thinking with the feedback but there’s also a lot of preparation in the sense of how they are supposed to present their ideas, the more technical aspects of writing. So that takes up time. For Literature it’s absolutely necessary; you have to do six essays. Last year, they had to do nine. So, it’s just not the ideas that count, the time practices that challenge their speed of writing is another one.

Given the requirements of mandated examinations (in his students’ case, the GCE ‘A’ level examinations), the preparation for examination assumes ‘central’ importance and overrides Sean’s attempts at incorporating critical thinking during teaching. To a large extent, such considerations shape his pedagogical practices in the classroom. Besides this, the lack of time also influences Sean’s pedagogical approach.

Of course, we have to manage the time to teach what we teach and so there are definitely lessons and periods where my teaching, has to be, I guess, a little more drill and practice.

Sean further cited how time was a constraint on his efforts to incorporate and encourage more student thinking during his Literature lessons:

If I had been more prepared [and had] more time, I would naturally think what would work even better and I would be able to pose more direct questions of characters. But I generally do that when they are
sharing their stuff and that's where I get them to think. But I think 
there's little time that they have to reflect on what they think about 
anything. So I put them on the spot [by asking questions in class] 
and this is good because it pushes them to think. But sometimes 
they need a bit of time. And when they take too long, I have to jump 
in and that sometimes doesn't generate much critical thinking.

Sean’s comments here also suggest that ‘wait time’, which is key in allowing 
students to develop their thinking, (Beyer, 1997; Black, Harrison et al., 2004; 
Costa, 2001c; Rowe, 1974, 1986) is one of the pedagogical casualties as a 
result of time constraints. In this regard, lesson observations suggest that 
Sean indeed ‘jumps in’ and did not always accord sufficient wait time for 
students to respond to his questions. Instances in his vignette of practice, for 
example, illustrate this. When students did not respond to the Socratic 
questions he raised in the discussion of Literature texts, Sean frequently 
opted to offer students his views rather than allow for more time for students 
to think about their responses.

Similarly, in his context, Nathan saw the need to cover the syllabus overriding 
his considerations on the development of his students’ thinking.

... in my class, I think more than the students, I look at what I have 
to complete, the syllabus and whatsoever. So within what I have to 
complete, I try to incorporate the kind of thinking that they need to 
have.

As such, the opportunities to incorporate critical thinking in normal lessons is 
limited given that students’ abilities, prior knowledge and lesson topics do not 
provide the latitude to do so. He elaborated that this is also because during 
normal lessons, students ‘have to learn particular skills because they are 
going to take the exam and things like that’ and added: ‘I guess on most 
occasions [in lessons], I am dealing with the teaching and learning part, 
purely focused on the content.’ Thus, like Sean, this influences his pedagogy 
to become more ‘drilled and practice’ and didactic instead of it being more 
dialogical and dialectic (Alexander, 2008; Paul, 1995; Wegerif, 2007).
Moreover, for Nathan, the issue was also the question of ‘focus’ because teaching in a ‘neighbourhood setting’ brings about its own concerns.

The aspect of critical thinking has been around for some time, it’s not something new. It’s just how much we are willing to focus on that because I think largely, when you teach in a neighbourhood [school] setting ... it’s very exam based. So, you target the exams and drill your students on so called how much they need to know and pass ... and do well in the exams.

His lessons observations support his claims here. As the vignette of his practice illustrated, his teaching is largely teacher-centred and content-focussed with few elements of classroom thoughtfulness manifested in his teaching.

Yet, Nathan felt that this would not be the case if there were no set requirements on what should be taught. Nathan said, ‘Of course, if you are free to do whatever you want to do, you probably can have more free play in developing materials which can facilitate critical thinking.’ Although the syllabus that needed to be covered does not seem to render itself naturally to the incorporation of critical thinking for Nathan, it does not mean it cannot be made to do so; it would just require ‘more work’.

But of course it [i.e. implementing critical thinking] would probably take more work because it’s quite easy to get materials to fulfil what they have to learn. Say comprehension and composition, there are a lot of materials out there. But if you have more freedom in choosing your material, then I think you can get something which is easier to employ this critical thinking bit.

Nathan also recounted how the syllabus can impact his pedagogical practices. In his case, the new changes in the Humanities syllabus ‘in question type forced our hand’ and a change in the conventional exam-oriented approach to teaching neighbourhood school students. He, together with the other teachers in his department, ‘realized that the old system was not able to help because students really need to think’, as required by the new syllabus.
Furthermore, with the changes, students 'were not going to know the answers by memorising' as they used to in the old syllabus.

However, there were problems that came with the implementation of the new syllabus which emphasizes the application of critical thinking. Nathan reflected:

... when the new Humanities syllabus was introduced, for example, quite a bit of them were finding it difficult — teachers and students. And of course, it became a problem for neighbourhood school students because their language itself is quite weak and since they express their thoughts in language so, there were difficulties.

Apart from the linguistic impediment that 'neighbourhood school students' face in the development of critical thinking, Nathan also noted that teachers found difficulties on a number of levels with the new demands created by the changes in the syllabus.

Firstly, crafting questions that require students to think critically because it's not easy. And, say for the Humanities context, you need to come up with original sources and because you have source based questions, you also needed to come up with questions that tested certain skills. And, of course, you have to prepare this series of answers too.

Nathan's experiences suggest that the syllabus changes posed challenges in terms of teachers having to adjust their pedagogical beliefs and approaches with the new aims (Fullan, 2001). The changes required teachers to redevelop their curricular knowledge, pedagogical knowledge and, consequently, their PCK and CTPCK in line with new curricular requirements.

For Ivan, although the syllabus he was teaching underwent some changes as part of TSLN, they are still insufficient. He felt that 'cutting or reviewing of the syllabus' further might help. Despite the changes made to the syllabus, Ivan pointed that the problem is that the mode of assessment remained the same and teaching is still very much examination-driven at the 'expense of other teachable moments'.
[With the cutting or reviewing of the syllabus], everyone is talking about Project Work and exposing our children to other materials, teaching less, learning more. But the thing is, at the end of the day, the mode of assessment is the same; it has not changed. It is still the Primary School Leaving Examination [PSLE], that ‘T’ score. So unless the people at the top change the direction or they do something about it, at the end of the day, everyone will still be gearing towards the PSLE at the expense of other teachable moments.

Ivan's remarks seem to imply that the assessment for learning (Black et al., 2004) rather than for competence is what needs to be incorporated as part of the changes; these can presumably effect genuine change in teaching and learning practices within the context of TSLN's emphasis on critical thinking.

As with the other teachers, the ‘time factor’ hinders Yvonne’s attempts at incorporating critical thinking and she saw this as her greatest hindrance. Illustrating how an inadequately developed CTPCK can make teaching critical thinking more demanding, just as an inadequate PCK can be a hindrance to teaching content effectively (Abell, 2008; Cochran & Jones, 1998; Nilsson, 2008) she remarked:

[The] time factor [a barrier in incorporating critical thinking] because if you want to carry out critical thinking lessons, you have to really think hard about how to go about doing it and deciding what you want from your analysis.

Like Nathan, observations of Yvonne’s lesson give credence to her remarks. Her pedagogical approach was predominantly teacher-centred and didactic in which few questions that engaged student critical thinking were observed.

The lack of time is a constant refrain among all teachers regardless of grade levels taught and teaching experience. Evelyn also stressed that the ‘time factor’ is a barrier in the incorporation of critical thinking in her lessons. Given the fact that there is the mandatory demand for teachers to cover content and develop students’ examination skills, such as writing and reading in General
Paper, there is little time left in most lessons to develop explicitly their critical thinking.

... frankly put, the syllabus is demanding and requires us to teach the students many skills. So other than having critical thinking, the students who mostly don’t have background in argumentative writing will have problems understanding the very concept of critical thinking.

Evelyn also found that attending to these aspects requires much time; time which could be devoted to critical thinking instruction instead. In addition, she said:

... the school expects us to mark a certain quota [of class assignments]. So that’s also another time factor and as a teacher I have to devote more time in class to teach the students or give them feedback on these assignments.

Thus, in Evelyn’s school and departmental context in which critical thinking is not explicitly assessed in assignments or is the main focus of teacher feedback, the completion of assignments and the preparation of feedback that came with them take priority over the aim to develop students’ critical thinking in the classroom.

The observations of Evelyn’s lessons support her suggestion that time is not a commodity which she particularly has in abundance. Although she evidently incorporated critical thinking through her Socratic questioning in lessons, time constraints appear to be manifested on a number of occasions in the lack of wait time she offered students to prepare their answers and respond to her questions, as illustrated by the vignette of her practice.

Moreover, Evelyn felt that having to complete assignments, which take the form of comprehension or essay exercises, requires more than just completing them. There is also the need for students to learn to be able to manage their examination time in ‘timed-practices’ and pass their subject, rather than just being able to think critically, echoing Sean’s sentiments. Timed-practices train students to complete their examination papers in the given time in preparation for the placement examinations. The notion of
assessment functioning as a means to indicate student competence here seems contrary to the assessment for learning which primarily serves the aim of promoting students' learning (Black et al., 2004). Consequently, when time becomes a factor, the pragmatic priority of being able to complete the examinations satisfactorily compromises TSLN's stated priority of developing students' ability to think.

In Ivan's case, apart from his inexperience, the demanding schedule makes it more challenging for him to set aside time to prepare lessons that incorporate critical thinking.

... there are a lot of things to be done in and outside the classroom and honestly, most of us don't have the time to plan lessons properly. Except for the time we attended some courses ... which encouraged me to do a bit more of critical thinking when conducting a lesson for a while ... think I am quite guilty of not really doing it.

Ivan felt that a reduction in the number of teaching periods or assistance with the marking load would allow teachers more time to focus on the planning and designing of lessons that can incorporate critical thinking, time needed to be better prepared for lessons which he felt he just did not have.

... if [some teaching periods] are taken away or we have some help in our marking load, that will free up time for us to really sit down and develop good lessons before we go into the classroom.

Despite this, lesson observations indicate that Ivan's questions do engage his students' in critical thinking. However, Ivan felt that the strategies used were largely spontaneous and unplanned.

The lesson which you observed, I didn't plan it. I was sharing with the children different types of strategies to help themselves so along the way it was more impromptu questioning.

**Students' abilities and attitude**

The teachers in the study unanimously agreed that the extent to which they enact critical thinking in the classroom is influenced by their students'
perceived abilities and attitude. In this light, teachers’ enactment of their critical thinking knowledge base also seems to be influenced by their context knowledge, which is a component of PCK that includes the knowledge of student behaviour and classroom climate (Nilsson, 2008).

Sean pointed out that his students’ abilities become a constraint against a more liberal incorporation of critical thinking in his teaching. The need to prepare ‘weak’ students for the examinations created a tension within him as they necessitate compromising his attempts of incorporating thinking during lessons — especially when these are set against the larger pragmatic objectives of examination preparation and the completion of the syllabus.

... if the entire class was weak... the need to finish the syllabus, prepare them for exams ... would start ... to take precedence over actually getting them to be thinking [critically] and that I found to be true when remedial students who come for remedial are concerned. Generally, you cut down really on the thinking.

Similarly, the way and the extent to which Roy incorporates critical thinking in the shape of questioning in class are also dependent on the abilities of the class. In reference to the ‘weak’ class he was teaching, Roy said that questioning ‘does not help very much’. But with a ‘better class’ it is different.

... if I were to teach a ‘better’ class, then there would be more of a challenge because the pupils are motivated to think. So if I were to teach a good class, these kinds of questioning techniques would spur [and] challenge them to think. I would also encourage pupils to criticise answers if it’s possible because this would generate them to think and to be critical about certain answers given because in these modern times, no one answer is correct. So I think that would help them to broaden the way they think.

Another factor that influenced Roy’s approach to questioning in class is the familiarity that students have with the lesson’s topic.

If it’s something that students are familiar with, they may be able to question ... they may have the idea of thinking critically, reasoning it
out. But of course, if it's going to be something beyond them, it may be difficult. So [the extent of questioning] must be within their level [of knowledge and ability].

However, Roy noted that his students' attitude and behaviour in class is another factor that affects how he incorporates critical thinking during his lessons. For instance, 'to see pupils thinking' is a 'motivation' for him to further incorporate elements of critical thinking during his teaching.

I can't really see them thinking, so to speak, but sometimes you can see it in their facial expressions. They put their hands there and look up; it's like they are trying to think and come up with answers. Whether they are right or wrong does not matter but their participation and enthusiasm does.

But, just as students' attitude can be a motivation, it can also be a 'hindrance'. Roy's attempts at incorporating critical thinking illustrate how student behaviour can affect teacher actions, as suggested in Clark and Peterson's (1990) model of teacher action discussed in Chapter 2.

[Pupils' attitude is a] hindrance in a sense that pupils refuse to speak; they are silent throughout. Sometimes, you wonder whether they are really thinking or they have thought about it and don't know the answer or they just can't be bothered to think ... sometimes it stops the lesson because I have to wait.

For Nathan, however, the issue of student abilities is nested in a larger socio-economic context; the aims and demands of critical thinking under TSLN seem to run against the realities of the practices and focus of his school context — a 'neighbourhood school'. In a 'largely neighbourhood setting', Nathan believes that, students, who are conventionally perceived as average, are primarily developed to pass and excel at the national examination with the aim to progress them to the next educational rung.

Students' linguistic ability in Nathan's classes is also a consideration; his students' inability to express themselves adequately played 'a very big role' in his decision to incorporate critical thinking strategies. This, as he noted, is
directly linked to students' linguistic proficiency, which in the case of his students, is on the low level. In this case, it would seem that students' cultural capital (Bourdieu, 1986), which encompasses linguistic competence (Blackledge, 2001; Reay, 1998), becomes a significant factor in the implementation of critical thinking. Nathan further reasoned how being primarily Mandarin speakers impeded his students' ability to be proficient in the language:

... at the end of the day, I think it's important for my students [to pass examinations] ... I mean my students don't use much English in their lives so, sometimes [when] you teach them these thinking skills, they find it hard to express their ideas as well and a lot of them close up. I think if they could do it in Mandarin, they would be able to express it better.

As a result, given the reciprocal links between linguistic and thinking competence (Block, 2001), this greatly curtails students' ability to articulate themselves critically. In spite of Nathan's attempts at incorporating critical thinking, his students still resort to rote learning due to their linguistic shortcomings in the English language. This consequently not only affects the way they learn and prepare for examinations, but the way he assists them in their learning.

... at the end of the day, I find that a lot of them still go back to memorising stuff and for my very weak students I, in fact, have even given them model answers which they look at and try to pick out ideas and all that.

Thus, Nathan views that 'language and thought — these two things — you can't separate'. Given that these two dimensions are conjoined in his view, and as suggested by Vygotsky (1986), he believes that 'if you want to teach critical thinking ... students need to be at the stage where they can express ideas'.

Nathan also felt that students' level of general knowledge and knowledge of current affairs is a significant factor that influences his decision to incorporate
critical thinking. Effectively supporting the 'specifists' argument of critical thinking teaching (Brookfield, 2003; McPeck, 1990; Willingham, 2008), he explained that having such knowledge provides the key 'context' for students to be able to think, especially in class discussions. He remarked, 'I don't think you can think devoid of context; you have to do it in a context.' For Nathan, it is also essential that learners make meaning before they are expected to be critical because a lack of understanding prevents learners from taking a critical stance on an issue (Durrant & Green, 2000).

However, having to equip students with such knowledge before incorporating critical thinking classroom activities becomes a 'constraint' on time.

... if the knowledge is lacking, then when you go to class, you have to deliver the knowledge first and then you got to think of the questions. So again, time is a constraint.

Thus, Nathan felt that the incorporation of critical thinking is most suitable in areas in which students have prior knowledge — knowledge which is essential prior to the task of thinking critically (Brookfield, 2003; McPeck, 1981; Marzano et al. 1988; Onosko, 1990; Willingham, 2008). This approach is also acknowledged to be a powerful predictor of student learning alongside teacher actions (Marzano et al., 1988; Underbakke, Borg & Peterson, 1993). But given that most of his lessons were content-driven, Nathan did not see 'much of their ability in critical thinking' during the delivery of standard lessons but only 'when we discuss wider issues' that go beyond the scope of such lessons.

Echoing Nathan, Yvonne saw her students' 'perceived ability' as a factor that impacts her decision to incorporate critical thinking. In addition, Yvonne cited other factors such as students' age and their academic stream. Intimating how low-achieving students affect her decision to incorporate critical thinking, she referred to the case of students from the Normal Technical stream, which is the stream for the less academically able, and explained, 'I think for Normal Technical classes, you do go into critical thinking ... But you got to take it a step at a time, slower [than for high-achieving students] and not so deep into it.'
Similarly, illustrating how her context knowledge (Nilsson, 2008) influences her enactment of CTPK, Evelyn highlighted that students' learning ability influences her incorporation of critical thinking in lessons and, more generally, her pedagogical practices.

... number one, it's the learning ability of my students. Sometimes some of them are not equipped with the right skills. So, I may be more prescriptive, meaning that I dictate to them what exactly I want because some of them don't have the basic language skills. So I will have to dictate to them very basic things like 'I need to have this and this and this in the essay' ... I tell them, 'Look, you have to do this and this'. So that's one way that hinders my initiative to encourage critical thinking.

In addition to her students' learning abilities, Evelyn perceives their learning styles and 'preference' as influential factors. In explaining how these impacted the way and extent to which she incorporated critical thinking in her lessons, Evelyn illustrates again how her context knowledge impacted on her PCK and CTPCK:

For example, the class you observed just now; they are quite bright, they can think on their feet but the problem is some of them have self-esteem issues. So, I would do more to actually elicit responses ... I would use more questioning techniques. My other class, they are not very vocal ... So, I will have some exercises where I tell them, 'OK, write down your answer and you give me your answer' rather than ask them to say verbally because not all students are verbal learners.

Consistent with the 'specifist argument' of the centrality of domain knowledge in critical thinking (Brookfield, 2003; McPeck, 1981; Willingham, 2008) discussed earlier and echoing Nathan, Evelyn also finds that 'it will be easier' to incorporate critical thinking in her lessons if her students 'already have a strong foundation in content knowledge'. Some of her students come to class with a competent level of content knowledge in terms of having an understanding of general and current affairs, while others were lacking.
Similar to Nathan, Evelyn feels that the time needed to develop some students' content knowledge compromises the attempts to develop their critical thinking, more generally.

Like Nathan, Evelyn also voiced that students' linguistic ability was a constraint in her attempt to incorporate critical thinking and pointed to the role of language proficiency as being a crucial determinant in the articulation of 'critical thought' (Block, 2001; Vygotsky, 1986):

... at the end of the day, I have to address the basics before incorporating critical thinking because even if they can engage in critical thinking, to a large extent their ability to express their critical thought is still hindered by their lack of language ability.

The 'basics' Evelyn felt she must address first with linguistically weak students before they are able to fully benefit from being able to think critically include improving their 'ability to write a proper topic sentence, construct their paragraphs and [use] basic grammar rules'. Like Nathan's students who were examination-oriented, Evelyn also found her students' 'practical' attitude, which inevitably shapes 'the learning culture' in the subject, as another hindrance.

... students nowadays are quite practical. They just want to say, 'Why are you making me think so much? I just want answers.' So I think it's also the learning culture.

Evelyn's students' learning culture seems to be a result of the cultural forces (Ritchhart, 2002) that shape much of their schooling and classroom settings in which emphasis is commonly placed on the preparation of high stakes examination, as mentioned previously, and discussed further in Chapter 6. However, as a classroom culture, her students' pragmatic attitude towards learning is antithetical to the development of thoughtful classrooms and a classroom culture of thinking (Ritchhart, 2002). Rather than one that fosters and values critical thinking as an essential key skill in the modern world, the students' learning culture and disposition is one that is largely geared towards content coverage and excelling in examinations.
Policies and the school context

Teachers also claimed that policies and the school context can impact their implementation of critical thinking — either directly or indirectly. For instance, the teachers unanimously stated that teaching critical thinking is not an explicit school or department aim; the absence of explicit school policies aimed at the development of students' critical thinking and those which guide teachers' practice had a bearing in their attempts to implement it. For instance, Yvonne remarked:

... if the school is clear in that the whole school is applying [critical thinking as part of classroom teaching and] there's a clear direction on how to go about doing it, then I'll feel more encouraged.

She continued, 'I think ... if you tell all teachers [that the development of students' critical thinking] is the aim, then we would apply it more effectively, more conscientiously.' Despite her school's Habits of Mind (Costa, 2001a) policy, Yvonne does not perceive the development of students' thinking to be explicitly formulated as part of her school's policy and central pedagogical aims.

In echoing a similar sentiment regarding the explicitness of policies towards the development of thinking, Roy felt that teachers like him do incorporate critical thinking. However, 'when we do critical thinking, some of us do it subconsciously; there's no proper plan at all'. He reasoned that 'if [the development of students' thinking] is important', then 'it should be taught in NIE', evidently suggesting how teacher education for him did not play a role in the development of his knowledge base. This, he believes, would keep prospective teachers 'aware that critical thinking does play a part in the development of our children to be thinkers', leading them to consciously and explicitly develop their students' critical thinking. Roy recognises its importance:

So that when students are older, they may also think in a critical manner; not just accept things that people tell them, also to analyse,
to think through and come out with logical answers based on their thinking process.

Moreover, Roy believes that the current emphasis on critical thinking at ministerial level is lacking and, consequently, affects the way in which it is being implemented in schools.

It would be good if MOE recommended this and make this a part of learning, just like when we talk about ‘Thinking Schools, Learning Nation’, ‘Teach Less, Learn More’ and if critical thinking can be part of these, then it shows that MOE is serious about this area [because] when MOE sets the tone, schools will definitely follow. So if that’s the case, then I think … there will be more support from principals and then we will have courses and guidance for all teachers.

Although recognising that critical thinking is part of the current ministerial slogans, Roy felt that the explicit emphasis on critical thinking as a pedagogical aim can help in its further incorporation.

It is not explicitly mentioned but in ‘Thinking Schools, Learning Nation’, ‘Teach Less, ‘Learn More’, it is, I believe, all in-built. It’s just not being mentioned explicitly. So I would want it to be more explicit if there’s a need.

Intimating teachers’ general lack of a knowledge base in the area, Roy remarked that teachers should at least have a clear understanding of critical thinking even though it may not be a core aim, which, on the contrary, it is in TSLN.

If not, it’s OK as long as teachers understand the term ‘critical thinking’; the whole works of it. In fact, it would be good. For me, right now, critical thinking is that and it’s broader than that and there are many more interpretations of it. If we can have a broader interpretation and in the way we see things, then it would be more beneficial.

Here, Roy’s remarks not only suggest that his teacher knowledge base of critical thinking is generally lacking, but also note the lack of explicit pro-
thinking policies at the school level. As such, having a sound knowledge base of critical thinking complemented by explicit pro-critical thinking policies can clearly be a significant factor in the incorporation of critical thinking at the classroom level (Gruberman, 2005; Onosko & Newmann, 1994).

Some teachers were of the opinion that certain policies indirectly impact and influence their implementation of critical thinking and thus function as enabling conditions. Nathan and Yvonne, who taught in the same school, felt that their PoLT (Principles of Learning and Teaching) school policy indirectly encouraged their awareness of critical thinking to a 'certain extent'. Nathan explained:

... [PoLT is] still in its infant years but we are applying it in our design of lessons. So when we think of lessons, one of the components we constantly try to think of is how our lessons enable our students to think. Maybe in terms of assessments, the questions that you ask and the content you deliver, how the students are able to apply it in different contexts. So, I think school policies do help to a certain extent.

Likewise, although critical thinking is not her pedagogical focus Yvonne stated:

Syllabus plays a big part because certain learning outcomes state that you have to encourage analysis although I've not applied it yet really. At school level ... Habits of Mind and ... PoLT do encourage [the enactment of critical thinking] as well.

In the same vein, Evelyn described the role that her department culture plays as being 'quite important' in the way and extent she incorporates critical thinking in her teaching. The department culture encourages her 'to be more critical and practise more critical thinking' although it does not have an explicit and systematic approach to it. Being given the opportunity and being encouraged to observe her colleagues conducting their lessons was a source of encouragement as they 'helped quite a bit'. Learning useful strategies from such observations and applying them in her own lessons served to
broaden her PCK in General Paper, the subject which she teaches. Such experiences are crucial to the development of not only her content knowledge, but also her PCK. This is because teacher education at the National Institute of Education, somewhat curiously, does not provide exclusive training for teachers teaching General Paper (NIE, 2008) despite the central importance of the subject at GCE A level examinations.

Like the internal department culture which plays a 'quite important' role in influencing the way and extent to which Evelyn incorporates critical thinking in her teaching, school policies are also influential. However, they do so to a 'smaller extent' and do so indirectly.

[School policies] do encourage certain things and they would actually focus on sharing materials and they would ask you or students more questions and yes we do get critiqued by certain people. So that will affect to a certain degree because you get direct feedback from your bosses [and] that'll affect [the way critical thinking is incorporated in my teaching].

However, Evelyn felt schools can play a greater part in the shape of policies that allow 'teachers time off from professional duties'. Evelyn reasoned why this is important and explained the problem she felt that afflicts teachers like her:

[O]ne important factor is time. Perhaps, you can give teachers time off from professional duties for us to have space [and] opportunities to learn, to think and I think the most crucial thing is that most of us don't have the time to stop and think about what we are doing; we are just producing and executing and we don't really spare much thought behind our lessons.

Although the lack of time limits her pedagogical reflections, Evelyn intimated that they are an important source of her PCK development. This is consistent with studies that found that the manner in which the teacher reflects on their teaching experience shapes the development of their PCK (Magnusson et al., 1999; Nilsson, 2008). It seems that Evelyn also perceives that allowing time
for teacher reflections helps to develop her CTPCK. Linked to this is the notion that for teachers' practice to improve, more time for professional learning needs to be accorded (Fullan, 2001, 2003; Hairon; 2008). And as Evelyn suggests, teaching must also be seen not only as technical work but an intellectual one too (Bascia & Hargreaves, 2000; Giroux, 1985, 1988, 2004).

Evelyn also believes that apart from giving teachers more time, school policies can also be influential by reducing the 'emphasis' they place on 'the product' of teaching rather than its process.

... time is a very important factor and perhaps ... a less emphasis on the product even though [school leaders] say things like 'Yes, we look at the process' but, somehow or other, I do not know how the schools [incorporate thinking]. They make [teaching assessment] a very tedious effort and at the end of it, [attempts at teaching thinking] become very contrived again ...You just say, 'I did this and did this and, therefore, it shows I am a thinking teacher'. I mean, why must things be so concrete? That's my question.

Evelyn's remarks here are contrary to TSLN's emphasis on the process of learning rather than the product (Tan & Gopinathan, 2000); they indicate the incongruence of appraisal systems with teachers' experiences of implementing thinking. It seems that for Evelyn, the assessment for learning (Black et al., 2004) is a more genuine means of appraisal rather than one that is aimed at verifying competence as prevailing assessments do.

**Conflicted teachers' beliefs and parents’ attitude**

For two teachers, Nathan and Sean, the factors of time, syllabus coverage and examination preparation impact directly on their beliefs when it comes to the incorporation of thinking. Nathan recognises the merits of developing students’ critical thinking. However, in practice he felt that he had to contend with the conflicting tensions between being pragmatic and seeing 'students becoming better thinkers'. In such dilemmas, Nathan made clear the choice he would opt for:
If you give me a choice between my students passing the exam and my students becoming, better thinkers and if I could shortcut these methods instead of going through this whole range of the thinking stuff and just zoom on doing well in exams, I think I would choose doing well in the exams.

Nathan sees the greatest hindrance to incorporate critical thinking being his own 'mindset' which stems from the constraints and hindrances he expressed.

... at the end of the day, you have got this idea that you want your students to learn for the sake of learning ... to gain more knowledge and to be better thinkers ... you don't learn inferential skills for nothing. These are supposed to develop their thinking as a whole but then again, you have this time constraint and you have exam preparation.

Nathan is aware that he has to grapple with the changes he needs to make. In light of the new syllabus that requires students' critical thinking ability to be developed, he is mindful that his pedagogical approach and beliefs also had to change:

I think system wise we are trying to make some changes ... So definitely my own paradigm I have to sort of shift and look more at the bigger picture and not to be too worried and focused on results and how students do [in examinations].

However, making the changes is not always something that was straightforward for Nathan. He remarked, '... my own mindset I have to relook and question because, sometimes, it's easier to just do like it has always been done.' This internal tension between having to depart from the old ways of teaching — brought about by syllabus changes — and then having to embrace the new against the existing constraints, seems to be a continuing personal reflexive dialectic. Illustrating how his reflections seem to shape his PCK and context knowledge (Magnusson et al., 1999; Nilsson, 2008) for the new syllabus, Nathan acknowledged, 'I guess I have to personally maybe continue to question the way I do things and reflect on my teaching.'
Thus, Nathan is clearly aware the changes in the ‘system’ imply changes in the way teachers teach as well: ‘These changes would include teachers as well; the way we see things’. But at the same time, he is caught in a pedagogical dilemma. He is uncertain if the same system that initiated the changes will also be able to ‘accept’ the possibility that ‘results may suffer’ in the ‘short term’. He wondered, ‘Will the system accept such things? I am not so sure.’

This being the case, Nathan stated that what would help him in his efforts in making the ‘paradigm shift’ was if the educational system and, in particular, the school accepts the possibility of examination results and standards suffering in the short term. This would also encourage him to move away from the traditional transmission mode of teaching to the new forms of student-initiated learning as exemplified by the emphasis on the development of thinking under the new syllabus changes and TSLN. He remarked:

... for students to think, they need to love the subject. To love the subject, you need to make stuff interesting [and this requires much time]. In the short term, results may suffer. So the system accepting such things would help.

Nathan’s reluctance to prioritise the development of students’ critical thinking is evidenced by the lesson observations. His largely didactic and teacher-centred approach and focus on content delivery to prepare students for placement examinations, as characterised by the vignette of his practice, clearly show where his priorities lie.

Similarly, in light of the attendant factors he is faced with, Sean seems doubtful about exerting efforts towards critical thinking. He remarked that he ‘infuses critical thinking’ in his lessons but is ‘not sure’ ‘whether it’s really part of something that will at the end have the effect of getting students to be better thinkers’. Instead, he wonders if students ‘might just end up being more pragmatic about being prepared for exams’. Like Evelyn’s students, Sean’s students’ attitudes are subject to the prevailing cultural forces (Ritchhart, 2002) that have moulded their learning culture. In this case, it similarly appears that the nature of the existent classroom cultural forces were those
that engendered students’ pragmatic attitude, rather than a culture of thinking (Ritchhart, 2002; Ritchhart & Perkins, 2008) in the classroom. Cultural forces such as the structure and routine that guide classroom life, and how the teacher acts and models for students did not seem to have promoted or valued thinking in the classroom. Sean suggested what would help him change his beliefs:

... a framework would help but it has to be a framework that’s applicable without being too complex and [one] that can be tagged for most things I am doing. So that would help; at least it’d help me refine the way, revisit or change what I am doing because maybe what I am doing does not always work.

Sean’s preference for a guiding pedagogical framework of sorts suggests that his incorporation of critical thinking was subject to his beliefs and knowledge base of critical thinking. Yet, there appears to be uncertainties in his knowledge base. What is absent for him is thus a concrete reference point and basis to further develop and guide his actions in the incorporation of critical thinking.

Similarly, Sean felt that his students can also benefit from a sense of clarity that a concrete framework guiding the teaching and learning of critical thinking would provide. In his view, making thinking and its value visible (Ritchhart, 2002; Ritchhart & Perkins, 2008) in such a framework would allow students to:

really see how evaluation of something or analysis, how it’s needed, how it applies and how it becomes a skill that they can develop. That is missing and even when I set them questions asking them to think and take up positions, they know what I am asking them to do, but the value of it and whether it’s getting them to improve as thinkers, they don’t see it or stop to think about it.

Sean also stated that getting his students’ ‘feedback’ on his lessons may help in convincing him more about applying critical thinking in his lessons.
I will need to be a little more aware of how students feel, think about what they are being asked to do and I don't normally do that. I don't ask students, 'Are you OK with the way I am approaching this lesson?'... I don't know how much of it they know is working for them or sometimes in terms of whether they see an improvement in the way they can think about things, whether they feel that they are better at analysing or evaluation. I think maybe ... some feedback in that [would help].

Sean's reference to 'feedback' indicates the important role it can play in enhancing students' thinking and learning (Black et al., 2004). On the one hand, he recognises the importance of his feedback in fostering students' learning. But on the other hand, he also expressed the need for the feedback to be reciprocal to better his pedagogical practices. Receiving student feedback about his teaching strategies may help modify them in order to better student learning and convince him further about his application of critical thinking.

For Evelyn, however, it is the parents' attitude that is a stumbling block to her efforts. She noted that the dynamics of 'the-student-is-client-relationship' is not one merely involving the student and teacher: 'Parents affect the dynamics [and] at the end of the day, it is the parents actually who demand results'. According to Evelyn, the problem is in the differences in the 'interpretation of education' by the different education stakeholders — parents and the school — which are also exacerbated by parents' pragmatic attitude towards the purpose of education.

I think the saddest thing is that all of us want the best for the child. But at the end of the day, everyone's interpretation of education is different ... the school says, 'Yes, critical thinking is good'; for parents, 'If it doesn't work, what's the point? I don't see the grades'.

Evelyn's remarks indicate the incongruence in the meanings of education between education providers (teachers and schools) and education receivers (students and their parents or guardians as the collective clients). While teachers and schools view education as being more than just academic
achievements, parents' general views of education remain traditional, that is, education is merely a means to fulfil academic qualifications. These differing views leave Evelyn conflicted between developing students' critical thinking and fulfilling parents' pragmatic expectations.

**Discussion**

The various subthemes discussed in this section collectively indicate that apart from the gaps and uncertainties in teachers' knowledge base, contextual and systemic factors also shape teachers' practice of critical thinking. Figure 14 illustrates these factors: the interconnected issues of the constraints of time, mandated examinations and curriculum coverage; students' abilities and attitude; policies and the school context; conflicted teachers' beliefs and parents' mindset.

Given these findings, it is argued that beside the gaps and uncertainties in the teachers' knowledge base of critical thinking, contextual and systemic factors and teachers' beliefs, which in some cases are shaped by these very factors, constrain the implementation of critical thinking in the classroom. Based on the emergent themes also, the state of teachers' knowledge base is further compromised by these external factors which in turn exacerbate the difficulties teachers face in implementing critical thinking. It is the combination of these interrelated factors that seems to have led to the limited, partial and arbitrary implementation of critical thinking in the classroom, as discussed in the first part of the chapter.
Regardless of the grade level taught and teaching experience, the teachers in this study unanimously attested that time is a significant factor which impacts the extent and manner to which they incorporate critical thinking in their teaching. This finding parallels other studies done in the context of critical thinking. Gruberman’s (2005) study which looked at teachers’ practice of higher-order thinking found that time and mandated assessments are obstacles in teachers’ practice. Time is also identified as a factor in Onosko, Newmann and Stevenson’s (1990) earlier study. Similarly, Retna’s (2007) recent study of the learning organisation in the Singaporean context found time to be an obstacle in teachers’ efforts to incorporate thinking in lessons.

However, a seemingly ‘bloated curriculum’ exacerbates the time constraint, necessitating the need for teachers to cover a curriculum which is ‘a mile wide and an inch deep’ (Onosko & Newmann, 1994, p. 35). Thus, in such a
context, it is the prescribed curriculum which becomes the priority, engendering a curriculum hegemony over the other areas. Although the Singaporean curriculum was reviewed and revised to emphasize student engagement with critical thinking and assessments that focussed on process rather than product under TSLN (Tan & Gopinathan, 2000), teachers in this study, regardless of the grade level taught and teaching experience, indicated that there is still an urgency to cover content and prepare for examinations, compromising their efforts to implement critical thinking. In some cases, examination preparations also impact the way teachers approach their teaching as in the cases of Sean and Evelyn. That is, their approach tends to become more ‘drill-and-practice’ and ‘prescriptive’, rather than constructivist and learner-centred, when faced with time constraints. And supporting Paris’ (2009) observations of Singaporean education, this is where the curriculum becomes ‘prescribed’ and where teachers ‘transmit’ the curriculum, while students ‘reproduce’ it.

A bloated curriculum also affords little time for students to explore and reflect on information as teachers focus on content delivery (Onosko & Newmann, 1994). This, as the study and data from other Singaporean classrooms at primary and secondary level also indicate (Paris, 2009), is when teachers’ questions become closed and less inclined towards thoughtful and diverse responses. In the bid to prepare students for mandated examinations and cover content, teachers’ questions become largely closed and expected responses are pre-determined to be correct or incorrect (Black et al., 2004). In the same manner, Beyer (1997) notes that time is a factor when implementing the various approaches to thinking instruction in a curriculum.

However, in the context of TSLN, the notion of a curriculum that marginalises and sidelines the development of students’ thinking is problematic. TSLN’s intended emphases on the development of critical thinking and process over product in the revised curriculum (Tan & Gopinathan, 2000) are inconsistent with the study’s findings. The peripheral role of critical thinking in teachers’ pedagogical considerations and lesson objectives leads to its shallow implementation, suggesting that TSLN ministerial emphases have not filtered
down to the frontline of education — teachers' pedagogy and practice in the classroom. Ironically, the curriculum that is intended to be the vehicle through which students' critical thinking is emphasized and developed is perceived to have a marginalising effect on it. The need to cover curriculum content is evidently at odds with the aim to engage and develop students' critical thinking.

Consistent with Clark and Peterson's (1990) model of teacher thought and action, this study indicates that teacher actions also seem to have been influenced by student behaviours. The manner and extent to which teachers in this study enacted critical thinking are impacted by their students' attitude and perceived abilities. In the cases of Ivan and Roy, their students' positive reactions and attitudes in the classroom can encourage them to further incorporate critical thinking in their teaching. But in the cases of Sean, Nathan and Evelyn, students' abilities influence the way and extent to which they incorporate critical thinking in their lessons. Factors such as students' academic abilities, linguistic proficiency and knowledge are seen as fundamental factors determining the extent and manner of their enactment.

Teachers' perception of academic ability as a hindrance to encouraging thinking among low-achieving students is a common one. The perceptions held by Nathan, Yvonne and Roy regarding low-achieving students and critical thinking are congruent with the commonly held teacher belief that higher-order thinking strategies in teaching are not suitable for low ability students, as found in Zohar's (2004) study. Zohar found that teachers who have traditional conceptions of pedagogy tend to perceive that higher-order thinking is unsuitable for low-achieving students, while those who hold more constructivist notions thought otherwise, thus suggesting teachers in this study may also hold core pedagogical beliefs which are inconsistent with TSLN's aim.

However, such perceptions about students are rather misplaced in the context of research which suggests that low-achieving students benefit when higher-order thinking is fostered or incorporated in teaching (e.g. Gibbons, 2009; White & Frederiksen, 2000; Zohar, 2004; Zohar & Dori, 2003).
Moreover, Martin (2001) asserts that ‘all learners, at all ages, need and benefit from active involvement with the explicit application of higher level cognitive strategies’ (p. 211; emphasis added). In other words, teaching thinking is an inclusive rather than exclusive enterprise. This is also supported by a previous study (Bryson & Scardamalia, 1991) that found a purposeful incorporation and encouragement of higher-order thinking brought about improvement in educationally disadvantaged students. Therefore, teachers’ misconceptions can be remediated and the perceived barrier removed if, through dedicated professional learning, teachers learn and understand that low ability and teaching thinking are not necessarily mutually exclusive (Zohar & Dori, 2003).

In terms of students’ linguistic proficiency as an impediment to incorporating thinking, the interdependent relationship between language and thought, as suggested by Vygotsky (1986), is highlighted by Nathan and Evelyn. The students’ lack of linguistic proficiency in English, which is the medium of instruction in Singaporean schools, is perceived to present its own problems — the barrier in language is also seen as a barrier to the incorporation of thinking in the classroom. This parallels Gardner and Hatcher’s (1989) observations following their review of programmes that teach thinking:

... nearly every program we have considered acknowledges the importance of language facility to effective thinking in one way or another ... [The student] must become an adroit manipulator of language, logical forms, computer programs, or other symbol systems that, in effect, can serve as vehicles for thought. (p. 48)

In this regard, Block (2001) also points to the essential function of language in thinking in which the competences of both these areas shape each other reciprocally. It could also be said that the extent of cultural capital (Bourdieu, 1986), which in this case encompasses linguistic competence (Blackledge, 2001; Reay, 1998), that students bring into the classroom is seen to affect the extent to which critical thinking is implemented. Thus, students’ low linguistic ability can be seen as a significant hindrance in teachers’ attempts at incorporating thinking, especially when time is a constraint.
However, Nagappan’s (1998) study of higher-order thinking in English language classrooms suggests that this need not necessarily be the case if teachers have the knowledge base to implement thinking strategies. His study indicates that teachers in language classrooms can incorporate thinking in other ways. One way is through the use of problem-solving strategies that can foster higher-order thinking although this only offers one aspect of thinking development. As such, while students’ linguistic competence may be a barrier, the incorporation of thinking can be manifested through other means if teachers have the advantage of a wider knowledge base of critical thinking in which to suit their particular contexts.

Moreover, some argue that when it comes to teaching English, intellectual engagement is indeed a central aspect and not something to exclude in the development of literacy and thinking. Gibbons (2006), drawing on the findings of Newmann et al (1996) on increasing academic achievement and intellectual development, emphasizes that ‘students from all backgrounds are more engaged when classroom work is cognitively challenging than when it consists solely of conventional low-level work’ (p. 1). In this light, Gibbons argues for the importance of incorporating ‘intellectual quality’ when teaching English learners. She goes on to suggest that English lessons need not be ‘defined by low-level drill and practice activities and a focus on basic grammatical forms excised from authentic contexts of language use’ (p. 2), which some teachers in this study were observed to have done.

In terms of student knowledge being a barrier to the incorporation of thinking, the literature points to the important role content knowledge plays (e.g. Brookfield, 2003; Costa, 2001b; Marzano et al., 1988; McPeck, 1990; Onosko & Newmann, 1994). In the cases of Nathan and Evelyn, students’ lack of knowledge is also seen as a major impediment in infusing critical thinking in their teaching next to the need to cover the content and syllabus. In this regard, Onosko and Newmann (1994) suggest that besides intellectual skills and dispositions, an in-depth knowledge of content area is necessary for critical thinking to occur. This is more so, given that teachers in this study privilege exam preparation over the development of the three factors above.
that Onosko and Newmann (1994) found which are necessary in the
development of thinking. Similarly, specifists such as McPeck (1990) argue
that thinking is domain specific. That is, thinking cannot exist in a vacuum and
is ‘irrevocably context bound’ (Brookfield, 2003) and therefore requires
knowledge of the issue concerned.

The student ‘learning culture’ that has been established in the classroom over
the years also impacts teachers’ decisions to incorporate thinking. In the
cases of Evelyn and Nathan, this learning culture is engendered by the
profound sense of student pragmatism that sees passing and faring well in
the examination as being the ultimate goal, contrary to ministerial
exhortations under the TSLN framework (Lee, 2004; Tharman, 2005).
Strategies such as the generation of critical thinking in lessons through
questioning techniques, for example, are perceived as irrelevant and
impractical in light of the central aim of passing the subject.

However, such a learning culture amongst students is rather revealing when
it is thought of as the product of the prevalent classroom cultural forces,
which include the classroom expectations, routines and structures set, and
teachers’ and students’ attitudes (Ritchhart, 2002). Given that the nature of
cultural forces shapes the level of thoughtful classrooms and cultures of
thinking (Ritchhart, 2002), it appears that the classrooms that students have
been part of were devoid of cultural forces which actively promote and value
thinking. Instead, the cultural forces — such as the classroom expectations
and routines and structures — which have been prevalent seem to be those
that value the pursuit of examination grades more than the value of the
quality of students’ thinking, learning and understanding, as aspired in the
TSLN vision (Goh, 1997).

Prevailing summative assessments that are geared towards the endorsement
of competence rather than formative assessments which promote students’
learning (Black et al., 2004) may also be complicit in the creation of the
pragmatic learning culture that marginalises the efforts towards critical
thinking in the classroom. To a great extent, this can be attributed to the
larger Singaporean educational context that traditionally places high priority
on examination results and national testing. Paris (2009) highlights this prevailing emphasis on summative assessments in the form of high stakes testing in Singapore which also perpetuates didactic teaching and rote learning in most schools. Assessments, he observes, are still dominated by closed questions which are mainly focused on the 'reproduction of factual knowledge', drawing mostly on students' lower-order thinking skills such as remembering (Anderson et al., 2001).

Consequently in Singapore's socio-cultural context, when time becomes a factor, the pragmatic priority of being able to complete the examinations satisfactorily compromises TSLN's official priority of developing students' ability to think critically. Like teachers, students being hard pressed for time, are compelled to adopt a pragmatic attitude in school; they merely look to the shortest route to pass and excel in education, which is seen as both a 'national virtue' and personal 'economic necessity' (Paris, 2009).

The teachers' situation of grappling with time also supports Liew's (2008) assertion that Singaporean teachers are caught up in the process of labour intensification (Hargreaves, 1994) in which 'the multiplication and diversification of teachers' roles and responsibilities' (Liew, 2008, p. 154) are compounding the problem of the lack of time. This also is contrary to ministerial pronouncements of according more time for teachers to reflect on their practices (Lee, 2004; Tharman, 2005). For instance, Evelyn pointed to the lack of a 'work-life balance' in the current situation that leads to 'many teachers nowadays feeling very exhausted'. She felt that constantly being 'exhausted' prevents teachers from thinking 'in a more refreshing way' and is one of the reasons why they avoid 'innovation' in their approach to teaching.

This situation seems to have consequently manifested in a major impediment to incorporating critical thinking in the classroom and critical teacher reflection as teaching thinking requires thinking teachers (Duffy, 1994; Page, 2004; Giroux, 1985, 2004; Martin & Michelli, 2001).

In addition, Evelyn and Yvonne remarked that the preparation for critical thinking-infused lessons demands time. But, time in the hectic schedule of
teachers is a rare commodity. In the circumstances where teachers are expected to carry out administrative and extra-curricular duties on top of normal teaching duties, the priority of according extra time to design lessons that develop students’ critical thinking ability becomes secondary to these duties.

Therefore, set against the context that teachers have a host of both school and individual aims and targets to meet, it is unsurprising that the development of student critical thinking becomes marginalised to the periphery of their pedagogical decision-making and practices — all teachers despite the grade level taught and teaching experience indicate this to be the case. These situations which teachers find themselves in suggest an incongruence with ministerial pronouncements of creating ‘white space in the curriculum’ that aims at giving teachers time ‘to reflect more [and] to have more time for preparing lessons’ (Tharman, 2005). Furthermore, they mirror the ‘proletarianization of teachers’ work’ (Giroux, 2003, p. 206) which sees the job of teaching as merely the technical execution of curricular objectives, devoid of an intellectual dimension.

In terms of influencing the enactment of critical thinking, school policies appear to be the proverbial double-edged sword. As ‘constraints’ and ‘opportunities’ in Clark and Peterson’s model (1990) which are external to teachers’ theories and beliefs and student behaviours, they also impact teacher actions. In the case of Evelyn, her school’s policies and departmental initiatives are seen as the sources of encouragement to incorporate critical thinking in the classroom.

Yet, in the cases of Nathan and Yvonne, their school’s PoLT initiative had a more profound impact on their professional reflections rather than their explicit incorporation of critical thinking in the classroom. In connection to this, Yvonne believes that a more explicit pronouncement of the development of student critical thinking as a clear school-wide instructional objective can help encourage her to incorporate consciously critical thinking in her teaching. This is also echoed by Roy in his comments discussed previously.
The influence of external factors such as policies on the incorporation of thinking is also identified by Gruberman’s (2005) study.

Working in a school system or building that explicitly emphasizes high-level thinking, encourages teaching for thinking in the classroom, and offers teachers exposure to program, strategies, and methods for thinking fosters a belief both in the appropriateness and efficacy of such an approach, and in the importance that the system attaches to thinking as a central concern and area of focus for all students and teachers. (p. 298)

However, in the cases of the teachers here, generally, the opposite seems to apply. In spite of TSLN’s explicit official focus on the development of critical thinking (MOE, 2006, 2008b; Tan & Gopinathan, 2000), all the teachers are in school contexts in which there is neither an explicit focus on students’ development of thinking nor initiatives that clearly prioritise it. Moreover, while teachers recognise the importance of thinking in the TSLN vision, the context in which they work does not deem this important in the shape of explicit pro-thinking school policies that support TSLN’s critical thinking aim. In this regard, Golding (2006a) and Costa (2001b) have highlighted the importance of the school environment in the development of thinking. For instance, Costa (2001b) asserts that:

efforts to infuse thinking, creativity, and intellectual development will prove futile unless the school environment signals the staff, students, and community that the development of the intellect and cooperative decision-making are the school basic values. (p. 135)

Similarly, Golding (2006a) argues that a true ‘Thinking School’ is one that incorporates thinking as an all encompassing philosophy in which the school’s practices, culture, and surroundings all advocate and encourage good thinking. As such, successful ‘Thinking Schools’ demand a deep paradigm shift across all levels and facets of the school to achieve an effective implementation of the thinking curriculum.
Thus, in the context of teaching critical thinking, it is also the immediate environment in which teachers operate that has great bearing in shaping their actions, materialising as ‘constraints and opportunities’ (Clark & Peterson, 1990). This is because ‘[t]eachers will more likely teach for thinking, creativity and cooperation if they are in an intellectually stimulating, creative, and cooperative environment themselves’ (Costa, 2001b, p. 135). Thus, the lack of conducive environments in which teachers in the study are situated generally can be described as another disabling factor, or ‘constraints’ in their attempts to incorporate critical thinking.

In terms of their articulated pedagogical beliefs, all the teachers subscribe to constructivist views about teaching. However, the observations of lessons, which are characterised by the vignettes of their practices in Part I of the chapter, suggest that not all teachers translate these into regular classroom practice and do so to a varying extent. The key elements of classroom thoughtfulness were noted to be largely absent in some teachers’ lessons (e.g. Yvonne, Nathan and Roy), while other teachers’ lessons demonstrated a number of these (e.g. Sean, Evelyn and Ivan). For instance, while Yvonne espouses learner-centred strategies, the observations of her lessons indicate that her teaching is mostly teacher-centred. As pointed out by previous studies (e.g. Paris, Wasik & Turner, 1991; Roehler & Duffy, 1991; Raymond, 2008), this suggests that while teachers may subscribe to particular beliefs, classroom complexities can often impede the embracing of their beliefs in their teaching approaches. Moreover, beginning teachers’ (as it is the case with Yvonne) limited PCK, can manifest itself in didactic pedagogies (Cuban, 1984; Paul, 1995; Shulman, 2008) and prevent teachers from reflecting their beliefs in practice as indicated in other studies (e.g. Brickhouse, 1990; De Jong et al., 1998). In the same vein, I suggest this to be the case with the lack of CTPCK which affects teachers’ implementation of critical thinking.

Similarly, while Nathan believes in the merits of developing students’ critical thinking, his teaching does not reflect such beliefs. In the context of his ‘neighbourhood school’, he found that the majority of his students were not linguistically proficient in English. Here, the level of students’ cultural capital
also seems to have affected their linguistic competence and perceived abilities (Blackledge, 2001; Reay, 1998). In terms of teachers' situational context, Ritchie, Tobin and Hook's (1997) study indicated that teachers' pedagogy is influenced by the school environment in which factors such as the lack of time, students and examinations are significant. These same factors are also identified by teachers in this study as constraints in their efforts of implementing critical thinking in the classroom. In other words, teachers' manifestation of PCK and CTPCK in the classroom are impacted by their context knowledge (Abell, 2008; Nilsson, 2008).

**Summary of chapter**

To recapitulate, the major themes and findings arising from the data pertaining to the second research question stated at the beginning of the chapter are:

- Contextual and systemic factors shape teachers' practice
- Teachers' knowledge base shapes teachers' practice.

Chapters 4 and 5 have now presented the teachers' perspective of critical thinking. Chapter 6 next examines the perceptions and experiences of critical thinking from the students' perspective. Through the formulation of emergent themes, I discuss their perceptions of critical thinking.
CHAPTER 6

UNDERSTANDING STUDENTS’ PERCEPTIONS OF CRITICAL THINKING

Introduction

Following Chapters 4 and 5 which addressed the first and second research questions, this chapter addresses the final research question: What are students’ perceptions of critical thinking? It examines the role students perceive critical thinking plays in their learning and schooling, how they see themselves as ‘thinking learners’ and the factors that shape students’ perceptions.

Hearing students’ voices allows for an understanding of their perspective of critical thinking and consistent with the qualitative case study methodology (Merriam, 1998, 2009; Stake, 1995, 2008), this adds a different layer in the understandings of critical thinking in the Singaporean educational context. The students’ perspective also affords a source of data triangulation (Merriam, 1998, 2009; Patton, 2002) and provides for a more holistic understanding of the research issues. Moreover, in the context in which educational systems aim to develop students’ thinking and the habits of lifelong learning, such as is the case in TSLN, attaining an insight into how students understand thinking is important (Ritchhart, Turner & Hadar, 2008).

Following the analyses of the data pertaining to student participants, two main themes were emergent: classroom experiences shape students’ perceptions of critical thinking and systemic and contextual practices shape students’ perceptions of critical thinking. These are now discussed.

Classroom experiences shape students’ perceptions of critical thinking

Students’ perceptions of critical thinking, especially those of students from upper secondary and pre-university levels, unsurprisingly, appear, to have been shaped by their schooling and classroom experiences. Figure 15 illustrates how the schooling and classroom experiences contribute to the
perception that critical thinking plays a marginal role in learning. Students from the upper secondary level and those from the pre-university level stated that critical thinking has not been a significant part of their learning during much of their schooling since primary school. That is, learning has not always been seen as a necessary consequence of thinking critically or an essential component of the learning process.

Figure 15: Classroom experiences shape perceptions of critical thinking

‘You really have to think in junior college’: the lack of emphasis on critical thinking in secondary and primary level education

Junior college, or pre-university, students unanimously felt that critical thinking only took significance in their learning and schooling at pre-university level. Learning at secondary and primary education levels was hardly seen as being intertwined with or a consequence of thinking critically. For instance, a pre-university student commented how the emphasis on critical thinking only began when she entered junior college as learning in secondary school was largely didactic:
As compared to primary or secondary school, [practically everything that] you learn in junior college, you have to think [critically]. In the past, all the equations were given to you and you just continue without thinking. But now, you have to think about a lot of stuff; how to apply to such questions and stuff. (Evelyn’s focus group)

Likewise, another pre-university student realized how ‘learning’ in secondary school differed from junior college:

... back in secondary school ... you were just learning and learning and after that when it came to junior college, I realized critical thinking is important; that I need to apply whatever I learn. (Sean’s focus group)

Moreover, her remarks interestingly suggest the distinction between what she perceives as learning and thinking. That is, thinking is seen as a disparate process from learning prior to the entry to junior college where learning, in effect, entails a more ‘surface approach’ emphasizing strategies such as memory and knowledge retrieval, rather than a ‘deep approach’ (Biggs & Moore, 1993).

Pointing to the general absence of student engagement of critical thinking at the primary school level, other pre-university students also lamented about the restricted thinking opportunities in the classroom during primary school. One student remarked, ‘In primary school [it was a case of] ‘do this, do this’; there was no room to explore our ideas.’ Yet, another student saw herself and others like her as ‘passive learners’ in primary school.

Here, students’ perceptions of the lack of engagement of their critical thinking prior to entering junior college is inconsistent with the creation of thoughtful classrooms and cultures of thinking which are fundamental in the development of students’ ability to think critically (Beyer, 1997; Costa, 2001c; Ritchhart, 2002). In effect, their experiences are contrary to TSLN’s aspirations and aims of making critical thinking a central process of learning (Tan & Gopinathan, 2000; Ng, 2008).
Given the salient absence of classroom experiences that impress the fundamental role of critical thinking prior to pre-university schooling, students saw the ability to think critically assuming more significance only at pre-university level. One pre-university student commented, 'I have only realized critical thinking is important in these recent few years.' For another student, the absence of having to thinking critically in his prior schooling experiences only came to light upon retrospection.

During the journey until secondary school I didn't think [critically] much; only recently when I began to think back. Once you have the ability to think [critically] and think back over the 10 years [of schooling, you realize that] you were not doing much [critical thinking]. (Evelyn’s focus group)

Lesson observations in Evelyn's and Sean's classes support the pre-university students’ consensual views here. As discussed in Chapter 5, in comparison to the secondary school teachers (Yvonne and Nathan), their lessons illustrate a number of key elements of classroom thoughtfulness that encourage the development of students’ critical thinking. These included their teachers raising challenging questions and structuring challenging tasks where students were regularly encouraged and expected to offer explanations and reasons for their conclusions. Socratic questions were consistently raised in these lessons as a means to encourage students to think critically about the topics being discussed.

Students' work samples also indicate that their assigned tasks required them to employ critical thinking skills. For instance, questions in General Paper essay assignments that students attempted include: 'Selfishness is a desirable quality. Do you agree?' and 'The internet is taking over the role of traditional media. Do you agree?'. Class tasks of this nature require students to formulate opinions, consider alternative viewpoints, and provide reasons and evidence for their assertions. To complete such tasks successfully, students need to use cognitive skills and processes that constitute critical thinking (Ennis, 1990; Facione & Facione, 2006; Paul, 1995) and also have an adequate level of knowledge on the topic to be able to think critically.
(Brookfield, 2003; McPeck, 1981; Onosko & Newmann, 1994; Willingham, 2008).

Similarly, in Literature assignments, questions such as 'Othello is much more than a study in sexual jealousy. It is a tragedy about the loss of faith. Do you agree?' and 'Discuss the opinion that Prospero exerts a harmonising influence in the world of The Tempest' require students to employ critical thinking skills such as formulating opinions, considering alternative viewpoints, and providing reasons and evidence for their assertions (Ennis, 1990; Facione & Facione, 2006; Paul, 1995). They involve students having to formulate opinions, consider alternative viewpoints, and provide reasons and evidence for their assertions by making textual references from the plays.

'**The average lesson ... just sit down and listen**: prevailing teacher-centred pedagogies and rote learning

Students' perceptions of critical thinking only coming to the fore at pre-university level appear to be more specifically linked to the nature of their teachers' actions and behaviours in the classroom. These include teachers' pedagogical approaches and students' perceptions of their teachers' capacity to incorporate critical thinking during lessons.

Students, especially those at the secondary school level, support these perceptions; they felt that their lessons were generally still very much teacher-centred. This appears to have the consequence of marginalising student engagement with critical thinking and opportunities for it. Upper secondary school students pointed to their limited role in lessons which were normally dominated by teacher talk and didactic teaching. One student remarked how this resulted in the lack of teacher-initiated opportunities for critical thinking:

> Learning through thinking [critically] normally happens on our own without the teacher's help because that's not what [teachers] do in school; they are not prompting us to think [critically]. Usually in lessons, they are just bombarding us with facts. (Nathan's focus group)
Another upper secondary school student described the absent role of student critical thinking in daily lessons. 'The teacher will just give you the question and she'll start writing down the answer; [there's] no need [for us] to think [critically]'. And, her classmate in sharing her experiences illustrates how learning is still conceived as involving traditional rote learning in which teachers themselves foster, contradicting TSLN's calls for constructivist pedagogies (Ng, 2008; Tan, 2007):

To me, it's a burden to memorise and [it's] stressful. But some teachers do give us tips on how to memorise certain passages...my teacher used to tell me that you have to see it [what you have to memorise] everyday, paste it on your wall ... memorise it for a month then you'll finally get it without seeing the paper. (Nathan's focus group)

These students' thoughts are best illustrated by the excerpt of their responses to the question of why they think teacher-centred and rote learning are still the dominant pedagogies used and encouraged in their classrooms.

**Interview excerpt 1: Group interview with Nathan's students**

<table>
<thead>
<tr>
<th>Betty:</th>
<th>It's traditional...for... years you have been getting this kind of [didactic] method because the old people [i.e. the teachers] think that teaching like that is better!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alisa:</td>
<td>Yeah, Singapore wants us to learn a lot of things so that we can be a multipurpose country but in the end, we would not be as successful as we think.</td>
</tr>
<tr>
<td>Andy:</td>
<td>I think they [i.e. MOE] want to push Singapore [up to] a very high standard but...the more they want us to learn, the more confused we are and...the more we don't know anything. So we end up being a useless country!</td>
</tr>
<tr>
<td>John:</td>
<td>I think it's because they [MOE] produce the textbooks so we must learn from them. Without textbooks it might be better!</td>
</tr>
</tbody>
</table>

Although students' comments in the excerpt were made in a light-hearted manner, they nonetheless reveal the pragmatic philosophy of Singaporean education (Tan, 2006a) in which education is perceived to serve the national economic need (Ho & Gopinathan, 1999; Gopinathan, 2001; Paris, 2009; Tan, 2007). This seems to be where students' learning and interest are perceived
to be tailored merely to serve the collective national agenda at the expense of learners’ individual needs and interests.

Upper secondary school students also remarked that when critical thinking did occur, much of it typically took place when they were revising their school work on their own. One student commented:

Most of the time we are not thinking unless we revise at home individually... Then maybe we will get it. I mean we will understand [what was taught in lessons earlier]. (Nathan’s focus group)

Her classmate shared this sentiment: ‘I agree. Actually, teachers don’t make us think a lot in lessons. After they have taught us, I don’t feel they have taught me a lot of how important [critical] thinking is.’

Students were also asked how often lessons that incorporate elements of thoughtful classrooms (Beyer, 1997; Onosko & Newmann, 1994) took place. For instance, how frequently their lessons engage them critically through challenging tasks and encourage dialogue among themselves and teachers through questioning and reasoned responses. One student’s remarks encapsulate their experiences when she wryly responded, ‘Once in a blue moon.’ Although the rest of students’ lessons in other subjects were not observed, observations of their English lessons with Nathan support this. Lesson observations corroborate students’ views of the mostly didactic and teacher-centred pedagogies that were existent in their classes. As discussed in Chapter 5, Nathan’s lessons were in general didactic and content-focused. There were few elements of classroom thoughtfulness observed. For instance, questions posed in class were largely limited to closed questions that assessed understanding and those that required recall (Anderson et al., 2001) and, consequently, there were few opportunities and questions for students to be engaged critically.

In addition, samples of students’ class work indicate that their class tasks do not particularly focus on the development of their critical thinking skills, as raised in Chapter 5. While questions such as ‘What are some of the problems faced by teens in your country?’ and ‘What are the qualities of a good
teacher?’ in class essay assignments, for instance, are open and ‘multilogical’ (Paul, 1995) and require students to make judgements, Nathan’s written feedback of students’ work suggests that the skills and quality of reasoning and justification were not a focus of the task. Instead the main emphasis is purely on the development of students’ literacy.

The responses and classroom experiences of secondary school students here are corroborated by the experiences of pre-university students discussed previously. Students at pre-university level claimed that, in retrospect, critical thinking did not figure prominently during secondary school education with there being few opportunities for the engagement of their critical thinking. And, relative to their general experiences at pre-university level, critical thinking is, to a large extent, not made explicit or particularly valued in the learning process during secondary schooling.

However, some pre-university students felt that the incorporation of critical thinking and the nature of classroom pedagogy were also dependent on the teacher’s ability and the type of subject taught. Not all teachers are perceived to be able to incorporate thinking during lessons — or possess the adequate CTPCK (critical thinking pedagogical content knowledge) — and not all lessons are seen to be best taught using critical thinking strategies either. An excerpt of the group interview with Sean’s students captures these sentiments.

**Interview excerpt 2: Group interview with Sean’s students**

**Laura:** I think lessons with critical thinking are definitely better because I don’t think it’s about learning the information as much as the skills that you develop with critical thinking. When you learn and challenge the topic, you can learn more content and you can apply it to the real world rather than memorising facts and figures. But I guess it also depends on the teacher who manages to promote critical thinking because not everyone can do that. And for some lessons, I think having the teacher spell things in a systematic way [i.e. being didactic] may be a more effective way for you to learn. For example, Chemistry practicals. If the teacher doesn’t explain the procedures like ‘you do this and this’ and if he explains the rationale rather than prompting you to think ‘why are we doing this?’ then it would be easier. I think in some ways, it depends.

**Jeanne:** For me critical thinking, it can be quite tiring. I mean if you don’t like certain subjects like Maths and you have to think critically about it, then it would be a torture. So whether a lesson or all lessons should involve critical thinking is questionable because not everyone can appreciate it. It’s difficult because you need the skills. Not
everyone and not every teacher can promote critical thinking in the classroom. And maybe in subjects which don’t require critical thinking, it’s difficult and it’s not something you can force on people. You got to have a chance to develop it; you can’t throw critical questions and expect them to understand right away.

Nancy: Yeah, sometimes, it might be better for teachers to tell you step by step why and what’s the rationale because if the teachers makes you think and you don’t get it, it can be very discouraging. So, it depends on your learning style as well.

Sean’s students’ comments suggest that pedagogies have to be suited to the academic discipline, lesson topics and students’ learning style. In other words, students’ remarks indicate that teachers’ PCK is essential in making their learning effective (Abell, 2008; Nilsson, 2008; Shulman, 1986, 1987), while teachers’ CTPCK is also important for them to be able to ‘promote’ and ‘encourage’ critical thinking in lessons. Some lessons such as Chemistry practical sessions were perceived to be best taught didactically. This is not only because such lessons match students’ preferred rote-learning style in the subject, but also because students saw little need in making them think critically.

Perhaps, this is due to the nature of these subjects. In comparison to the Humanities, subjects such as Science are monological (Paul, 1995) and less ‘open-ended’ in nature being already ‘well-defined’ with ‘correct’ outcomes and models in the subject in contrast to the former which are more open to divergent responses (Black et al., 2004) and multilogical (Paul, 1995). Therefore, unless the teacher has an adequate CTPCK and is, for example, able to ‘open up’ discussions and challenge students to evaluate accepted scientific outcomes and models in their lessons, opportunities for student critical engagement and participation is perceived to be limited in these subjects.

**Systemic and contextual practices shape students’ perceptions of critical thinking and learning**

Like systemic and contextual factors that impact teachers, systemic practices and contextual practices impact students. Systemic practices are practices and circumstances that are perpetuated by and attributed to the larger instituted educational system and structure. On the other hand, contextual
practices are practices and circumstances engendered by and the result of more individual and arbitrary contexts of learning and teaching shaped by the immediate schooling environment and, in particular, teachers.

Students’ perceptions of critical thinking in their learning and the role they perceive it to play are not only shaped by their teachers’ actions and other classroom experiences, but pre-university students, especially, indicate that entrenched practices inherent in the educational system are also a factor. As illustrated in Figure 16, these practices include the teaching and learning culture and the systemic emphasis on examinations that seem to counter their intuitive perceptions about the role of critical thinking in their learning.

Figure 16: Systemic and contextual practices shape students’ perceptions of critical thinking and learning
'Memorise, memorise, memorise': the emphasis on rote learning and examinations

Most students acknowledged that learning in school and preparing for assessments are very much about memorising rather than thinking critically and understanding; school does little in making thinking critically an essential part of learning in which the need for memorisation relegates the role of critical thinking. An excerpt of the group interview with Nathan’s students best illustrates these sentiments among upper secondary school students when asked their feelings about the importance of critical thinking in their learning.

**Interview excerpt 3: Group interview with Nathan’s students**

<table>
<thead>
<tr>
<th>Betty:</th>
<th>I think it’s half, half. We need to memorise things but [during activities that teach students life skills] teachers also let us know that we have to think or else there will be consequences. They teach us things like we can’t take drugs. So we know what will happen to us if we choose a different path. So [during these occasions] we will learn about thinking [critically] a little. But like memorising, it’s more like in Maths and Science.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mary:</td>
<td>For me, not really. It’s more like just talking and talking, memorising and memorising!</td>
</tr>
<tr>
<td>Alisa:</td>
<td>I agree. They don’t make us think a lot in lessons. After [lessons], I don’t feel they have made us think and [shown] the importance of critical thinking.</td>
</tr>
<tr>
<td>Andy:</td>
<td>Yeah, I think school makes us memorise things rather than thinking [critically]. Thinking is more like how do we schedule our time slots to memorise things we have to learn! So learning is more like memorising.</td>
</tr>
</tbody>
</table>

Given that learning in the academic subjects is largely defined by memorisation and rote learning, these students also expressed that examinations and assessments demand much memory work and little critical thinking. Another student from the group later expressed why he felt that learning in school is the equivalent of memorising and related an example that convinced him of this belief.

... learning is more of memorising rather than thinking because I actually have a friend who did not know he had this test because he was absent ... So what he basically did was he memorised all the formulas, everything ... I was quite surprised by [the score] he got. It
was almost full marks because all he did was ask, ‘May I borrow your piece of paper to memorise?’ And he just memorised everything and [answering the test questions was just] through the [memorised] formulas, that’s all. (Nathan’s focus group)

His classmate, however, perceived the need for rote learning and memorisation as serving a more pragmatic aim: ‘You do all this [i.e. memorisation] for your O levels to go to a junior college or polytechnic’. Junior college and polytechnic education are alternative pathways after completing the GCE O level examinations (see The Singapore Educational Landscape in Appendix 5 for an overview of the educational system).

Pre-university students expressed that their teachers’ emphasis in the preparation of examination limits their desire to question and think further beyond what is tested, curtailing the thinking disposition to be seeking truth and understanding (Ritchhart, 2002). One student remarked, ‘When you ask, the teacher says it’s not part of the exam [so] it restricts our learning.’ She further suggested that such emphasis on examination preparation even hindered and eventually quelled her natural disposition to question. Thus her thinking disposition to be curious, seen as integral in developing the ‘characterological’ dimension of thinking critically (Costa, 2001a; Ritchhart, 2002) was stymied. She elaborated:

… when I was very young, I was persistent in wanting to find out about things and it’s OK when you were young to do so. But as you grow up, the ‘whys’ become harder and the more you keep thinking of ‘why’, the more you can’t go forward. Over time, it’s tiring to think ‘why’ when you really ask and … give up asking why because when you really ask, people get frustrated and teachers tell you it’s not needed [in the examinations]. (Evelyn’s focus group)

Her classmate echoed these sentiments and commented:

The teacher says, ‘It’s for exams. You only need to know for the exams. The exam requires this, this. So you know this, this, this; you
don’t need to know the other stuff. So, it restricts us from knowing things and linking things better. (Evelyn’s focus group)

However, other pre-university students indicated that there are larger elements which are at play. One student from Sean’s focus group intimated how ‘the system’ is not conducive to critical thinking and, in effect, does little to assess learning (Black et al., 2004) and engage her to think critically. The short excerpt of the group interview further illustrates students’ sentiments about the role of critical thinking in their learning.

**Interview excerpt 4: Group interview with Sean’s students**

**Laura:** Well, you can’t really think your way through the system right?...most of the time in exams, you are just recalling facts, you are not really thinking [critically], it’s just verbal diarrhoea [i.e. regurgitating information], writing whatever you remember...So no [critical] thinking involved in that...So, thinking is all that unless you write something about themes or essays [in English Literature or General Paper]...

**Jeanne:** Yeah, you don’t necessarily have to think [critically] to learn in our context. We were all taught to memorise this, memorise the numbers, whatever...there’s no [critical] thinking involved there.

**Dan:** For me, critical thinking is part of learning but then again, for certain subjects like Maths, the learning is just listening to what the lecturer says and applying. I am not being made to think [critically]. It’s about time and practicality, there’s no room for you to think in order for you to learn. You are just learning for the sake of learning, that’s all.

**Peter:** We must differentiate between learning and studying. To learn you have to think. But to study, you can think but not advisable because it’s not practical. Like everyone has been saying. If you want to analyse the formula, what’s the point? They have given it to you.

**Nancy:** I agree.... When it comes down to your content and whatever you have learnt, seeing whether you have mastered or understood that topic leaves you no time to think. So it’s just verbal diarrhoea. Sometimes, you get too tired out to even think when it comes to the evaluating....

These students’ comments suggest that although critical thinking became more prominent at pre-university level, it still assumes a largely minimal role in their learning. In examinations, lower-order thinking skills like remembering (Anderson et al., 2001) are still the order of the day and the emphasis on content predispose students to rote learning and what students referred to as ‘verbal diarrhoea’, or regurgitating information, during examinations. This
marginalises the need to think critically in order to learn and understand which is in contrast to what writers such as Paul (1995) and Anderson et al. (2001) assert: for learning to be effective, critical thinking must precede knowledge and understanding, which are products of thinking.

Students also perceived that subjects such as Mathematics, as opposed to subjects like General Paper and English Literature, leave little room for critical thinking given that these subjects largely have ‘well-defined correct outcomes’ and ‘models and explanation’ (Black et al., 2004, p. 17). As suggested previously, subjects such as Mathematics are primarily monological in that it commonly has definite answers, thus leaving little room for divergent perspectives and thinking. In contrast, subjects such as General Paper and English Literature are multilogical because the issues found in their subject matter can be approached from various divergent perspectives given the lack of conclusive views (Paul, 1995).

Interestingly, some upper secondary school students seem aware of possible reasons why the rote learning culture negated the need for students to think critically as part of learning. One student commented: ‘If teachers just keep on telling us about what we need to memorise, we won’t think ....’ Suggesting what can be done instead to develop students as thinkers, she continued, ‘Teachers should plan lessons ... that make us think [because] if we think more, then we can be better thinkers.’

On this note, her classmate suggested what the teacher can actually do in lessons to encourage more students to think critically. This is done through less didactic and explicit teaching and more student self-directed learning during classroom activities that foster students’ critical thinking.

For example in Chemistry, the teacher will give us this worksheet and explain almost everything and then we will do them ourselves. But I’d rather she ... explains the main points — what does this and this, we read the instructions and mix the chemicals ourselves. (Nathan’s focus group)
‘It’s so systematic, so structured’: inherent rigidity and structuredness

For more than two thirds of pre-university students, their perceptions of critical thinking and learning seem to be a consequence of the educational system which was perceived to be ‘rigid’ and ‘structured’. It is these inherent features in the system that students felt have constrained their critical thinking development. They also seem to have shaped students’ perceptions of learning as being rather linear and by rote. Consequently, the inherent rigidity and ‘structuredness’ engender the perception that critical thinking plays an insignificant role in their learning and schooling. One student remarked:

... we have been so used to a system that’s so structured [and] in our education system, we have been conformed to thinking that. We are so used to going: ‘Step 1, step 2, step 3’. It’s so systematic, so structured. (Sean’s focus group)

However, even in subjects such as General Paper and English Literature, in which students perceived most critical thinking occurs, there is an overwhelming sense of structure that students see as an impediment to their development of critical thinking. The excerpt of the interview with Sean’s students illustrates these sentiments.

**Interview excerpt 5: Group interview with Sean’s students**

<table>
<thead>
<tr>
<th>Peter</th>
<th>I have to conform to the system. I can’t say something critical about the text [in literature lessons].</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dan</td>
<td>I agree. For example, during GP [General Paper], teachers give you this question. It encourages you to think critically from both points of view but the GP teacher will tell you to think from this point of view [because] it’s best, it’s easier. So in theory, this discourages you from thinking in other ways already. So, you are supposed to follow what they want to mark, but not what you like to write about. So it’s really a constraint.</td>
</tr>
<tr>
<td>Jeanne</td>
<td>I agree that in GP, currently, things are quite structured. There are more politically correct views to follow so, maybe that might be more a acceptable thing to do than trying to be a critical thinker. They shouldn’t discourage certain views just because it’s not politically correct.</td>
</tr>
</tbody>
</table>

This excerpt suggests that students felt an overbearing sense of structure that impedes their critical thinking in the classroom even during the lessons.
where they believe that critical thinking is most encouraged. There is a perception amongst these students that further critical thinking opportunities are at times restricted by the stifling expectation towards conventional ideas during lessons.

Furthermore, this sense of perceived structure extends to assessment objectives that have a curtailing effect on the encouragement of critical thinking. One student from the group expressed how this became detrimental in the way she thought and pointed to the emphasis on grades as a cause:

Sometimes, marking schemes [require that] you have to fulfil this criteria. And it’s so structured. You are trained to think in that way and not other ways. So it doesn’t promote critical thinking; you are forced to think that way. So it’s the emphasis on grades again and it should be less structured and more leeway should be given to students. (Sean’s focus group)

Other pre-university students also found that the manner in which students’ critical thinking is fostered is so structured that it becomes an impediment to the development of their thinking. The excerpt below captures these perceptions.

**Interview excerpt 6: Group interview with Evelyn’s students**

**Anna: I think mostly at junior college level, [the incorporation of critical thinking] seems a little fake and forced. Teachers try so hard to inject thinking into everything we study like Socratic Questioning. It’s like ‘think about this first before you go into that’. Thinking is supposed to be natural right? I think it’s only unique to Singapore’s system alone because you are trying to make students not so textbook based [and] it seems really fake. I don’t think it achieves its purpose...**

**Lorraine:** As she mentioned, some of the thinking involved, seems like there’s no purpose behind it, for example, writing essays. In secondary school, [you were taught]: state the point and elaborate and then link it back to the essay question. But now in General Paper, it’s like there’s so many steps you have to go through and if you don’t go through those steps, you can’t write an essay and that’s not really true because it restricts our innovation [i.e. being able to think critically in other ways] in that sense.

**David:** Applied in the wrong way, critical thinking impedes the way you can perceive things differently. In Singapore, they are just trying out all these things [i.e. different educational initiatives like critical thinking]. So I think [critical thinking] takes time before it is integrated properly so that it becomes a natural course for us to think critically.
Anna: Yeah, they should trigger our [critical] thinking naturally instead of forcing us and giving us steps to think. This really restricts our thinking. Like 'Step 1, you have to think of this and next step you have to think of that'. It should come naturally.

The excerpt suggests that students perceive the sense of restriction and haste in the way in which critical thinking is developed in learners. Their remarks portray the impact of the cultural forces (Ritchhart, 2002) which have been shaping their classrooms and the larger school context. In their case, the cultural forces that include the establishment of class and school procedures, routines and behaviours seem to have created a learning environment which is perceived to be intellectually stifling, rather than one which promulgated independent thinking during learning and teaching. In effect, students perceive that the nature of these cultural forces marginalises the importance of the development of their critical thinking abilities and dispositions during learning. And in light of the students’ previous educational experiences that are largely devoid of any emphasis on critical thinking, efforts at incorporating critical thinking at pre-university level in subjects such as General Paper are then seen as contrived and overly structured. The combination of these factors engenders students’ perceptions of rigidity and structuredness in the system, which is collectively perceived to hamper the development of their critical thinking abilities and dispositions.

‘Can you stop the critical thinking crap?’: pragmatic attitudes and time constraints

On top of the practices that emphasize rote learning and examination preparation, students expressed that time is a hindering factor in efforts to promote and develop their critical thinking in the classroom. The constraint of time identified by students parallels that of their teachers in the study, as indicated in Chapter 5. For the students, the pressures on time are reflected in the lack of ‘wait time’, which is crucial in fostering critical thinking (Beyer, 1997; Brooks & Brooks, 2001; Black et al., 2004; Costa, 2001c; Rowe, 1974; 1986), afforded during lessons. For teachers, incorporating critical thinking becomes a secondary and peripheral pedagogical objective under time
constraints. One student remarked how the lack of time restricts the opportunities to think critically in school.

I think time is a very huge factor because in school, we don’t really have time to think. With the fast pace of lessons and everything, it only happens when we are doing our revision. It’s then when we think and find out things we don’t know and link up all the facts. (Evelyn’s focus group)

The pressure of time is also seen to be counter-productive to students’ thinking as exemplified by another student’s remarks.

You can’t be pressured by looming exams or under time constraints. Thinking doesn’t work that way. It has to be like free and easy, have a cup of coffee and relax. I feel very pressured and don’t get to complete my train of thought in the lesson. (Evelyn’s focus group)

Other students expressed difficulty in coping with the pressure of time and the need to think critically. One said, ‘For me, [lessons are] just too fast. I have to sit down and read it line by line and then think [critically] by myself. I can’t follow the pace.’ Another student noted the restrictive effect of time constraints on students’ thinking:

The time constraint is a factor in thinking [critically]. Under the pressure you can’t think. Are they trying to make us think under the pressure, which is quite ironic? It restricts our thinking. (Evelyn’s focus group)

Her classmate, oblivious to the irony of the ministerial vision Thinking Schools with her comments, concurred: ‘In school, it’s quite difficult to think. It’s too fast paced.’

In the cases when teachers (e.g. Evelyn and Sean) attempted to incorporate critical thinking during lessons, some students expressed that the lack of time compromised it. One student’s remarks reiterate the importance of wait time in the facilitation of students’ thinking during teachers’ questioning (Beyer,
1997; Black, Harrison et al., 2004; Brooks & Brooks, 2001; Costa, 2001c; Rowe, 1974, 1986).

We are required to think too fast as in the teacher asks you a question and you immediately have to answer and are not given time to prepare and organise your thoughts. (Evelyn’s focus group)

Similarly, other students emphasized how having more wait time can foster their critical thinking. One of them felt:

As long as I have more time to think [critically], then I will think better. Under lesson situations, I can’t think properly. But given more time, I can think [critically]. (Evelyn’s focus group)

A classmate wondered about the aim of teacher questioning and perceived that students are not being given the benefit of sufficient wait time to engage critically with the questions raised.

Especially in General Paper, the teacher asks you to think about an issue or a question. But you are not given time to think and yet she expects you to answer. I don’t really see the point of being asked to think when you are not given the chance to develop your train of thought. (Evelyn’s focus group)

Observations of Evelyn’s lessons do support students’ view that little wait time is provided. Evelyn was observed to raise Socratic questions that encourage students’ thinking but generally did not accompany these questions by providing adequate time for her students. Although most students responded to her questions, providing more ‘think time’ (Ritchhart, 2002), as students suggested, would allow them to enhance the quality of their response and thinking, serving the purpose of Evelyn’s questioning. The demand of a ‘bloated’ (Onosko & Newmann, 1994) and examination-driven curriculum also limit the opportunities for the wait time afforded by teachers to engage students with critical thinking. This is despite reconceptualising schools as ‘Thinking Schools’ (Goh, 1997) under the TSLN vision.
For another pre-university student, the issue of time and critical thinking was articulated with a philosophical sense of pragmatism: 'In this fast developing world, everything is too fast paced ... and you have to think fast. More time would be good, but quite impossible'. Therefore, unless time permits, this sense of pragmatism is at odds with students' intuitive desire to think deeper about issues and engage themselves critically during lessons. The circumstances in which most pre-university students found themselves are described by one student:

... in General Paper, teachers put questions up at the end of the lecture [and say], 'When you are free, think about it'.... I am interested but when I'm free, I'll probably be doing my homework or talking to friends. So, if there's a space [in school] where they make you think, I think it's quite good. (Sean's focus group)

She later commented: 'Teachers tell us that thinking is the ideal situation. But if you really can't think critically, then you just have to complete the schoolwork expected. [So] it is more for higher [achieving students].'

Students' sense of pragmatism here mirrors the pragmatic attitudes which their respective teachers collectively adopt in attempting to incorporate critical thinking in the context of a demanding curriculum. Their comments also illustrate how teachers' sense of pragmatism might be consequential in impacting students' perceptions of the ambivalent role of critical thinking in learning. This is consistent with Clark and Peterson's (1990) model of teacher thought and action. In the dynamics of the classroom, they suggest that teachers' actions have a significant impact on their students' thoughts and behaviours, as illustrated here. The teachers' pragmatic stance on the implementation of critical thinking is also seen in the way students perceived its marginal role in the classroom.

Time constraints and the need to prepare for and excel in examinations also shape students to be more pragmatic. The majority of pre-university students indicated that the aim of developing critical thinking is antithetical to the more 'practical' aims of examination preparation and content coverage. One of them commented:
I think of the practicality. I mean for the A level examination, you have to finish the syllabus. But at the same time, you have to come back for these types of lessons. Like can you stop the critical thinking crap? It's not going to work for 'A' levels. (Sean's focus group)

The student's remarks also suggest that examinations do not particularly assess or require critical thinking skills, thus, rendering efforts to develop critical thinking as irrelevant in the aim of examination preparation. This is again consistent with Paris' (2009) observations about assessments in Singaporean schools which encourage knowledge reproduction and are dominated by closed questions.

Other pre-university students indicated that 'practicality' prevents them from recognising learning as a product of thinking critically, which educationists (e.g. Costa, 2001b, 2001c; Dewey, 1938; Perkins, 1992; Paul, 1995; Resnick, 1987) stress continually is key, instead of it being the mere acquisition of content information. One student observed:

... it's about time and practicality of time; there's so much to cover in a short space of time that there's no room for you to think [critically] in order for you to learn. You are just learning for the sake of learning, that's all. (Sean's focus group)

Another student felt that learning is the equivalent of thinking critically but noted how time constraints compromise this belief and compel her to adopt a pragmatic attitude.

Thinking is learning. But if we have time constraints or practical reasons, then it's true what the saying implies — when you don't have time, just memorise this and get it over with so that we can carry on with our lives. (Sean's focus group)

A majority of pre-university students also felt that the lack of time and examination preparation prevent them from thinking critically, engaging content in greater depth for understanding. One of them explained that being
told to accept what is taught in lessons without further questioning and exploration for deeper understanding.

... is a very large thing in Singapore’s education system .... If we are curious about [what’s being taught and probe] teachers ... we are told to go research it in the library. So ... because of the time constraint and the trouble, we stop thinking [critically] and just accept [the information and move on because] we have to study for tests.

(Evelyn’s focus group)

Students’ remarks suggest how the class and the larger school environment fail to create a culture of thinking that promotes, values and makes thinking visible (Ritchhart, 2002; Ritchhart & Perkins, 2008) in the school and classroom. Instead, a classroom culture of pragmatism emerges — one which privileges examinations, content coverage and promotes rote learning and didactic teaching. Together with time constraints, these elements shape students’ pragmatic disposition towards the purpose and role of critical thinking in their learning.

Given the aforementioned constraints, some students recognise the tension in the need to find a balance between ‘practicality’, on the one hand, and the aim of the development of their critical thinking, on the other hand. One student’s remarks capture this sentiment as she acutely noted the tension:

The issue here is whether you want more practicality or you want to infuse more critical thinking? We need to strike a balance beforehand...Currently, what we have here, it’s not really a balance, but I guess we all get the message that thinking is learning; you can’t learn without thinking [critically]. (Sean’s focus group)

‘I still have a long way to go’: students’ low sense of self-efficacy as ‘thinking learners’

The previous emergent themes suggest the general lack of emphasis and development of students’ critical thinking, notable among students at upper secondary and pre-university level who have spent the most number of schooling years (10 to 12 years) under the education system informed by the
TSLN policy. Having spent virtually their entire schooling under the policy
privileges these students with the greatest hindsight perspective on their
educational experiences under the policy’s aims of promoting and developing
critical thinking.

However, the emergent theme arising from the data analysis suggests that
these students perceive themselves as far from being ‘thinking learners’ (Goh,
1997) as aspired by the policy. When asked how they saw themselves as
‘thinking learners’, one student, for instance, reflected on her previous
schooling experiences and responded:

I feel I have got a long way to go when it comes to critical thinking
because I have to know how am I supposed to go about applying
everything that I’ve learnt to the real world context. So, I have a long
way to go. (Sean’s focus group)

Her classmate expressed that without doing English Literature, which is a
subject that she felt promoted and developed her critical thinking, she would
have felt more inadequate about herself as a critical thinking learner.

For me, if not for Literature I wouldn’t call myself a critical thinker. I
think I … have a long way to go to stretch myself in critical thinking.
There’s so much you can do … there should be more opportunities
in other lessons... (Sean’s focus group)

The sentiment expressed here is supported by other students’ responses
when asked common examples of when critical thinking occurred in lessons.
Pre-university students responded that such thinking typically occurs in the
Language Arts and Humanities subjects — General Paper and English
Literature. One student commented:

[critical thinking] applies to a lot of Arts subjects. For example, like
Maths is systematic but it’s different when you come to Literature
class. There are different perspectives that are provided to you. [So]
it appears more often in Arts subjects compared to Science subjects.
(Sean’s focus group)
Furthermore, students perceive that the nature of Humanities subjects compel them to think critically for themselves given that they are multilogical (Paul, 1995) in nature and their content have no fixed answers or formula (Black et al., 2004). One student recognises this difference between the disciplines when asked for classroom examples in which critical thinking occurred.

In Humanities, there isn’t like one formula you can follow, for Maths, Science you can go about it in a logical way. Even if you didn’t know how to answer the questions there’s like a formula to follow. But in Literature, you really have to think critically and really using your own brain ... no one gives you answers. (Sean’s focus group)

Therefore, not all subjects have a similar emphasis on critical thinking at pre-university level according to the majority of pre-university students. They largely felt it is the Language Arts and Humanities subjects that encourage more critical thinking and have more room for it.

One pre-university student candidly admitted her low sense of efficacy as a thinking learner and pointed again to the lack of emphasis and development of her thinking skills and dispositions during her earlier years of schooling — thinking skills and dispositions which are integral in developing critical thinkers (Costa, 2001a; Halpern, 2003; Paul, 1995; Tishman et al., 1995).

Pathetic! ... Although it’s 10 years, I have only been thinking [critically] at junior college. At primary and secondary school level, it’s always model answers; I don’t really have to think. Now, I am thrown into this position ... where I have to think ... So it’s no use anymore because I am already developed in my study habit to get the model answer from the teacher and not think for myself ... So it’s a bit too late — should have started at primary school. (Evelyn’s focus group)

Her classmate responded and intimated how her thinking disposition was shaped over the years. Ironically in her case, it seems to be one which is averse to having to think critically, rather than that which inclines her to do so;
it is also a disposition which seems to have predisposed her to rote-learning, leaving her feeling largely intellectually inadequate.

I am a bit tired of thinking [critically] and am even scared to do so. At junior college, the context is too big and I am afraid I can't bridge what I am supposed to be thinking. Sometimes, in General Paper, my mind just goes blank when the teacher asks me a question. So that's when I start to be afraid of thinking ... I don't really think too much. I don't think I am a critical thinker ... I have this mindset of being scared to. (Evelyn's focus group)

However, another student said that she is uncertain if the education she received so far is significant to the development of her critical thinking abilities. Seeing herself as one who naturally thinks critically, she doubts if schooling truly plays a direct role in nurturing her abilities and dispositions in the area.

**The flipside: encouraging and nurturing students' critical thinking**

Given students' low sense of efficacy as critical thinking learners and the constraints that appear to curtail the development of their thinking, students recommended what they believe could aid the development of their critical thinking. Apart from having more time as discussed previously, two themes are emergent in their responses: *engaging students' interest* and *using constructivist teaching strategies*.

**Engaging students' interests**

Students' interest in academic subjects is a significant factor in encouraging critical thinking. A common sentiment expressed by more than three quarters of pre-university and upper secondary level students is how interest, or a lack of it, in academic subjects can be a major determining factor in fostering and encouraging them to think critically. One pre-university student, for example, remarked:

... my Maths teacher told us, 'Do you want to know the reason why this formula is like that?' I'm like, 'No'. I don't understand what you are talking about; I'm trying to grasp the concept and you are asking
us to think more ... And it works for me only if it's about what I feel, what is my opinion regarding something like Literature or General Paper, if it concerns me. Otherwise, why would I care how the formula works? (Sean's focus group)

Other students link the issue of motivation to current ministerial requirements that is perceived to coerce students into taking up subjects that they have no interest. This consequently compromises their motivation to engage themselves critically in the subjects and develop their critical thinking skills and dispositions. Comments such as 'we should be made to choose subjects we want to do in JC' and 'let us engage in subjects we like' typify the sentiments held by more than half of students in the pre-university and upper secondary groups. The revised 2006 GCE A level curriculum requires candidates to take subjects in Humanities, Arts and Science subjects to provide a 'broader education' (MOE, 2006). For instance, students in the Science course are required to select one Arts or Humanities subject and vice versa — that is, the choice of subjects has to be 'contrasting'.

Students from the different groups explained why being given the freedom to pursue subjects of their interest is important in the engagement of their critical thinking despite the mandated emphasis on a 'broader education' in the curriculum:

... if we are allowed to take the subjects we like, that's a more important thing in encouraging critical thinking because what we have now is encouraging contrasting subjects. But is this really the issue because ... that extra time could be used to further enhance critical thinking in a subject which we [are interested]. (Sean's focus group)

We should be made to choose subjects we are interested in junior college so that we can focus on one subject and think [critically about] that subject. As I said earlier, it's easier to think and more effective to think in a subject that you enjoy doing because like biology, for example, you'll have better chance of having
background knowledge and it’s easier to find the links and also [relevant to] ... your [preferred future] career. (Evelyn’s focus group)

... you have too many [subjects] to learn. If we concentrate only on ... subjects ... we like, we will have no choice but to think [critically about the] subject. But at least it’s something we like. But now, we are being forced to do a lot of things but ... the depth is not there. It’s a bit funny when they [i.e. MOE] incorporate this. (Evelyn’s focus group)

An upper secondary school student expressed similar sentiments, pointing out that having to take a range of subjects compromises a lack of depth.

... what we are learning now is basically, it’s like jack of all trades, a master of none. We are basically learning everything we can and later in our life we will find out [if it’s useful] ... now, I am having to juggle with so much stuff ... having many, many subjects — Literature, History, Geography ... right now, everything is squeezed together; it’s a very rushed ... and I don’t think even the teachers have the time to cover all the subjects. (Nathan’s focus group)

Using constructivist teaching strategies

A majority of pre-university and secondary students also recommended that teaching approaches have to be conducive to student-centred learning. Pedagogical approaches have to veer away from prevailing didactic and teacher-centred delivery of content so as to encourage students to think critically, discover, understand and construct meaning for themselves — these are seen as essential in the development of critical thinking (Beyer, 1997; Brooks & Brooks, 2001; Costa, 2001b; Perkins, 2001; Ritchhart, 2002). Secondary and pre-university students’ comments illustrate this:

... let us experience things ourselves. Like for Maths lessons, don’t just give us the formulas. Let us go and do it ourselves and go experience it ourselves. (Nathan’s focus group)

You should promote critical thinking ... as in you teach something and allow students the space to explore the subject on their own and
maybe ask more questions ... but give the students the space first on how things can be done. (Sean’s focus group)

One primary school student felt that teachers ‘should give more challenging questions to allow us to use our brain more often so that we won’t feel so bored in school’. In other words, questions that can be described as ‘thoughtful questions’ (Costa, 2001c) or ‘fertile questions’ (Harpaz & Lefstein, 2000) that engage the mind. Echoing this lack of student engagement of critical thinking in their current classroom and pointing to the importance of metacognitive reflections in the development of students’ thinking (Beyer, 1997; Costa, 2001b; Marzano et al., 1988, Tishman et al., 1995), another student suggested that there should be ‘more reflection at the end of lessons’. But perhaps, the sentiments among most students of how their critical thinking can be fundamentally developed in the currently teacher-centred classrooms are captured by the simple words of one lower secondary student from Yvonne’s focus group: ‘Do things that make you think for yourself’.

However, some students in Evelyn’s group commented on her strategies to incorporate critical thinking in the classroom. Lesson observations and interviews discussed earlier indicate Socratic questioning (Paul, 1995; Paul & Elder, 2007) is part of Evelyn’s General Paper lessons. And based on their remarks, Evelyn had introduced them to the types of Socratic questions in previous lessons. She was observed to raise such questions consistently, illustrating some elements of classroom thoughtfulness. However, some students had differing views of Socratic questioning as a means to help in their critical thinking and the manner to which it was introduced to them in class.

**Interview excerpt 7: Group interview with Evelyn’s students**

| Lorraine: | I think it depends on people. For Socratic questioning, I think it's useless. Firstly it's difficult to understand ... Why are you asking yourself questions? I mean if you ask yourself questions, then you will know the answer. Different structures help and guide different people to think. There's a difference between being forced and being guided to think. If the structure is there and guides you, it would help but if it doesn't guide then it means it's forced. Nothing will come out of it. |
| Anna: | I think the basis of Socratic Questioning is a good thing; it’s needed when you ask yourself questions but it shouldn’t be taught step by step. Instead it should be |
experiential like you sit down in a group and we ask each other questions. Once you have a group and we ask each other questions ... have a group discussion ... thinking in steps come naturally to you and you will memorise it ... and it will come naturally instead of forcing you to think this way. So maybe you learn how to think [critically] naturally through a facilitator. The teacher has to ... facilitate when you are short of points. She questions us back ... [so that] we know we can think like the teacher in future. This is then natural with Socratic Questioning instead of giving us a piece of paper with notes.

**Rose:** I think Socratic Questioning guides us when we share; when we share, we think through also. It’s more difficult asking ourselves. It’s better to share sometimes. Critical thinking doesn’t come naturally in us but it needs to be triggered by other people’s thinking.

**Samantha:** For Socratic Questioning yes ... you have to guide their thinking you have to have someone pose the question or else it’s quite hard to think of the question out of the blue.

Given her aversion to thinking critically, Lorraine could not recognise the need for Socratic questions as a means to encourage her critical thinking, finding it ‘useless’. Yet, Rose and Samantha see them as an effective way to initiate their critical thinking. Anna suggests that the teaching of Socratic questioning can be less didactic and more experiential under the guidance of the teacher in the lesser role of facilitator. Thus, while students mostly recognise the value of Socratic questioning, they do not seem to agree with the way in which Evelyn had introduced them to it as part of teaching them to think critically for General Paper.

**Discussion**

Primarily using data from student focus groups and, where appropriate and relevant, augmented by the data from lesson observations and students’ work samples, emergent themes discussed in this chapter indicate that students’ perceptions of critical thinking are largely shaped by their teachers’ actions and behaviours, which collectively form students’ classroom experiences. These, in turn, are shaped by a host of contributing factors. Concomitantly, these students’ experiences also influence their conceptions of what it means to learn. Like teachers, students’ perceptions of and attitudes towards critical thinking are shaped by similar systemic and contextual factors which are intrinsic in the educational system. These factors are perceived more as disabling rather than enabling conditions in the: development and the
nurturing of students’ critical thinking; the manner in which students’ perceive its role in their learning; and, ultimately, of themselves as ‘thinking learners’.

The majority of students shared the perception that critical thinking plays a marginal role in their regular classroom. The prevalence of teacher-centred pedagogies and the priority of covering content and examination preparation are the causes of such students’ perceptions. Linked to this, is the view that the educational system still remains rigid and structured. Such features present themselves as elements which are antithetical to the development and encouragement of critical thinking amongst pre-university students, especially. Pedagogies are perceived to be driven by the need to prepare students for examinations and content coverage, curtailing the emphasis towards the engagement of students with critical thinking. Although a link cannot be conclusively drawn, it is noteworthy that the lack of a culture of thinking (Ritchhart, 2002) in students’ educational experiences also parallels that of their teachers’ experiences during teacher education (e.g. Sean and Evelyn).

The data indicate that a consequence of the abovementioned factors is the students’ sense of pragmatism towards the peripheral role of critical thinking in their learning and schooling. These perceptions strongly corroborate the experiences of their teachers, who prioritise the pragmatic need to prepare students for examination and cover content over efforts to emphasize critical thinking in the classroom, as discussed previously. And, consistent with the suggested links between teachers’ actions and students’ thoughts in the literature, the teachers’ pragmatic approaches influence their students’ pragmatic attitudes towards critical thinking. Clark and Peterson (1990) illustrate these reciprocal links between teachers’ actions and students’ thoughts in their model of teacher action discussed in Chapter 2. Consistent with the findings of this study, the model demonstrates how teachers’ actions impact their students’ thoughts.

Furthermore, like teachers, students point to the lack of time which is exacerbated by a ‘bloated curriculum’ (Onosko & Newmann, 1994) that consequently marginalises the role of critical thinking in their learning. The
time pressures compel students to place little emphasis on the development of their critical thinking and instead focus on covering content and preparing for examinations, just as the teachers do. Moreover, the need to complete the syllabus under time constraints curtails students’ inclinations to think critically and question deeper during lessons.

Consequently, the lack of time to engage in deep thinking and questioning seem to have manifested into entrenched classroom structures and routines which prevent the emergence of a culture of thinking and the development of thoughtful classrooms (Beyer, 1997; Costa, 2001c; Onosko & Newmann, 1994; Ritchhart, 2002). These include a pragmatic learning culture among students who become: focused on examinations; passive participants during lessons; and rote learners. For instance, in terms of participation it was observed that students in Sean’s class did not always engage with the questions asked during lessons. Instead, students opted to wait for Sean himself to share his insights and then pen them down as notes which are seen as important in examination preparations.

In environments which do not explicitly emphasize or particularly value and reward thinking, it is unsurprising that students, while recognizing the importance of critical thinking the way their teachers do, perceive its role as peripheral in their schooling. In this regard, relevant literature (e.g. Beyer, 1997; Costa, 2001b; Golding, 2006b; Onosko & Newmann, 1994; Ritchhart, 2002; Tishman et al. 1995) has continually emphasized the role of a conducive environment in efforts to nurture and promote students’ critical thinking. This is where classroom cultural forces and elements of classroom thoughtfulness shape students’ conceptions of learning and thinking.

Moreover, it could be argued that Singapore’s larger prevailing cultural conditions that predispose schooling often seem to be an intangible impediment to the attempts to emphasize critical thinking as central to learning and the development of thinkers as the ultimate aim of education (Dewey, 1938; Lipman, 2003; Paul, 1995; Scheffler, 1989). Perceived as a national virtue and an economic necessity (Paris, 2009), excelling in education is traditionally seen as the mere procurement of academic success,
which is measured in grades and credentials but little else. And, as discussed in Chapter 2, this is also where education is seen as an instrument in the formulation and implementation of government policies (Gopinathan, 1999; Tan, 2007) and where highly competitive government scholarships promise recipients a lucrative job for life.

Woo’s (2008) study on a group of youths’ temporalities, which she defines as ‘lived experiences’, in Singaporean education corroborates the point here. She highlights the prevalence of ‘a modernistic temporality geared towards credentialist and materialist goals’ (p. 171) among youths that informs their notions of educational success. Woo describes this ‘modernistic temporality [as] one whereby people work hard towards the acquisition of credentials and material well-being’ (p. 164) and students’ pragmatism towards critical thinking identified in this study seem to have been predisposed by similar goals.

Thus, environments that predominantly shape Singaporean schooling are those that prioritise the achievement of such academic success in high stakes examinations (Paris, 2009), which are key to the subsequent acquisition of ‘credentialist and materialist goals’ (Woo, 2008), rather than the development of critical thinking skills and dispositions which are seen as a secondary and marginal aim in this enterprise.

In addition, Singapore’s larger political landscape that has traditionally nurtured and perpetuated ‘intellectual sterility’ (Trocki, 2006) is perceived to eschew divergent thinking and intellectual dissent, especially in the realm of politics (Davies, 1999). While this larger context might befit the introduction of critical thinking to develop ‘thinking citizens’, it is at the same time antithetical to the initiative of emphasizing critical thinking in schools (Tan, 2006b). The national landscape which has traditionally perpetuated acquiesce among the citizenry (Davies, 1999; Trocki, 2006) is highly incongruent with and not conducive to the aim of developing future ‘thinking citizens’ in schools. Thus, when the very national context which frames schooling is perceived to be generally intolerant of dissent and discourages public critical scrutiny (e.g. of government decisions and policies), this could be seen to present itself as an
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which is measured in grades and credentials but little else. And, as discussed in Chapter 2, this is also where education is seen as an instrument in the formulation and implementation of government policies (Gopinathan, 1999; Tan, 2007) and where highly competitive government scholarships promise recipients a lucrative job for life.

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implicit disabling factor for students and teachers to emphasize critical thinking in schools.

In the particular context of the school, Costa (1985, 2001b) introduces the notions of the ‘climate of thinking’ and the ‘intellectual ecology of the school’, which need to be ‘constantly managed and monitored’ in the aim of developing ‘students’ intellectual capacities’ (p. 136). In this regard, with the exception of Nathan’s and Yvonne’s school which has Costa’s (2001a) Habits of Mind as a school initiative, the other schools do not have explicit programmes or school policies that are aimed at the development of their students’ critical thinking. Thus, the lack of such school environments beyond the classroom also appears to have shaped students’ perceptions of the role of critical thinking in their learning.

Moreover, in terms of the ‘constraints’ and ‘opportunities that impact on teacher actions and student thinking in Clark and Peterson’s (1990) model (see Figure 1 in Chapter 2), it can be seen how all these larger and attendant factors are manifested in the environment. Factors and forces outside the confines of the classroom evidently impact both teachers’ and students’ perceptions of critical thinking in their teaching and learning practices. These factors include the lack of explicit school programmes and policies that prioritise critical thinking, the systemic emphasis on high stakes examinations, which do not explicitly assess critical thinking, and larger political and cultural forces that impact schooling.

And as previously suggested, under the external forces and time constraints, teachers adopt a pragmatic attitude — their pedagogical practices become geared towards content coverage and the preparation of students for examinations rather than focussed on their critical thinking development. This is also not helped by the observation that examinations in Singaporean schools are not perceived to explicitly assess these skills. A great majority of assessments questions are dominated by those that sought knowledge reproduction, while critical thinking questions requiring a critique and assessment of knowledge were a minority (Paris, 2009).
Furthermore, the emphasis in Singaporean education still seems to be on the achievement of standards which fuels the perpetuation of a pragmatic and 'credentialist educational culture' (Woo, 2008). For instance, while student tracking and banding have been lessened at ministerial level, schools still practise student banding and tracking voluntarily (Woo, 2008). Thus, the prevailing emphasis towards the achievement of standards consequently affects teaching and learning practices in schools with regard to critical thinking. Alexander's (2008) remarks are particularly salient and illustrative of the teachers' and students' predicament: 'In a culture of high stakes testing ... competition replaces collaboration, while coaching for recall against the clock subverts speculation, debate and divergence' (p. 112) — the classroom practices that especially foster and engage students' critical thinking in the form of dialogic teaching which he and others like Paul (1995) and Wegerif (2007) also advocate.

Thus, the lack of emphasis on and the development of critical thinking which appears to be a consequence of prevailing teacher-centred pedagogies and the other constraints discussed also seem to have shaped students' low sense of efficacy as 'thinking learners'. Even after 10 years of schooling that has been presumably informed by TSLN's critical thinking thrust, pre-university students do not perceive themselves as 'thinking learners'. The lack of efficacy identified here also parallels findings that indicate Singaporean students, despite regularly topping scholarly international tests, have self-confidence which is lower than the international average (Paris, 2009). Thus, while MOE (2006) professes 'broad based and holistic education', standards are still being implicitly emphasized and explicitly lauded by the educational system (e.g. Masterplan of Awards (MoA) for school excellence which schools in the study covet — see Chapter 3). This instance of what I describe as the aggrandization of standards seems to have come at the cost of students' sense of efficacy as thinkers.

Moreover, students' low sense of efficacy here resonates with Beyer's (1997) words: 'teaching or covering only information overpowers students, helping them to improve their thinking empowers students' (p. 308; emphasis in
original). In this light, it seems that the education the pre-university students have received so far, results not only in the sense of them being overpowered by the systemic and contextual practices, but that of disempowerment as well when it comes to their ability to think critically.

Interestingly, too, students' low sense of efficacy parallels the gaps and uncertainties in their teachers' knowledge base of critical thinking, suggesting further reciprocal links between the teachers' and students' thoughts and practices in the classroom context (Clark & Peterson, 1990). Students' perceptions are also supported by their teachers' unanimous views that the majority of their students come to class without knowing sound intellectual criteria to assess their own thinking, which, as stated previously, is an important aspect in the development of the quality of students' critical thinking (Bailin et al., 1999; Paul, 1995).

In the context of promoting critical thinking in the classroom, students' preferences for constructivist methods of learning are seen in their suggestions for pedagogical changes that feature student-centred learning; this is in the shape of experiential learning. Their collective views of how their critical thinking is best developed are consistent with what seminal educational theorists have espoused. Dewey (1938) emphasizes the importance of embedding learning in experience; likewise, Piaget (1964, 1968) suggests how experience significantly mediates the construction of knowledge, facilitating learning and understanding; while Vygotsky (1978) argues for the vital role of social interaction in the development of thinking and learning.

In terms of classroom social interactions and dialogue, Alexander (2008), Lipman (2003), Mercer (2002), Mercer, Wegerif and Dawes (1999), Paul (1995, 2001) and Wegerif (2007) contend that they play a significant part in improving students’ thinking in the classroom. Paul (2001), for instance, argues that students learn most effectively in the classroom through ‘dialogical situations in which they must continually express their views to others and try to fit others’ view into their own’ (p. 427), while Wegerif (2007)
asserts that the ‘capacity for dialogue as an end in itself’ (p. 126) is the essential thinking skill in which other critical thinking skills originate.

Furthermore, reporting on studies on classroom interactions, Mercer (2002), Mercer et al. (1999), and Pontecorvo and Sterponi (2002), commonly highlight that classroom dialogue among students and teachers during collaborative class activities enhances students' critical thinking abilities. Tellingly too, students' suggestions for such pedagogies as a way to develop their thinking are further corroboration of the current absence or lack of constructivist pedagogies in their educational experiences — experiences which are key in the development of ‘thinking learners’ and future ‘thinking citizens’ (Goh, 1997). And like their teachers, students also seem to illustrate their lack of awareness on the importance of critical thinking in the citizenry in a democratic society (Dewey, 1938; Costa, 2001; Lipman, 2003; Paul, 1995; Winch, 2006) beyond formal schooling.

The emergent themes that arise from students' collective experiences and perceptions are largely contrary to the aims of constructivist teaching and learning under TSLN's emphasis on critical thinking in schools. They also give support to Gopinathan's (2007) and Tan's (2007) concerns about implementing the TSLN vision. Tan (2007) comments that the TSLN policy requires that teachers replace conventional didactic pedagogies to more student-centred ones, in keeping with the reform aim. However, the study's findings indicate that in light of impinging systemic and contextual factors — which engender certain systemic and contextual educational practices — pedagogical changes have not to any significant degree occurred, corroborating his remarks.

Despite almost a decade of the Thinking Schools, Learning Nation initiative, there is evidence that crucial gate-keeping national examinations continue to exert an inhibiting and conservative influence on principals, teachers, parents and students, official talk of creativity and innovation notwithstanding. (Tan, 2007, p. 317)

Students' perceptions that learning and classroom pedagogies are very much content and examination-driven, which are present at the expense of
opportunities for the development of students' critical thinking, support Gopinathan's (2007) observations of Singaporean education. He notes that in spite of dramatic reforms in the TSLN era, there still is a lack of significant change in pedagogy and practice in Singaporean schools and classroom.

... at the school level, change, while it is occurring, is not yet fundamentally changing pedagogy and practice. Teachers having to cope with large classes, a content dominated curriculum and high stakes examinations have taken on initiatives like thinking skills but rather than allow for a reconceptualisation of practice have, in many cases, bolted on acceptable elements and routinised procedures ...

(p. 67)

Therefore, the prevalence of rote learning and 'didactism' (Paul, 1995) in the educational system that aims to make thinking the heart of learning are at odds not only with the express objectives of TSLN, but against what a number of theorists have also stressed (e.g. Dewey, 1938; Paul, 1995; Perkins, 1992; Lipman, 2003; Resnick, 1987). This is where learning ought to be essentially a consequence of thinking rather than memorisation which the traditional 'transmission' mode of learning effectively propagates, echoing a pedagogical principle that I submit ought to guide schooling: I think, therefore I learn.

The study's findings also indicate that prevailing teaching and learning practices are still deeply entrenched within an educational system which stymies the inherently progressive aim of developing 'thinking learners' in Singapore. These previously discussed practices also collectively mirror the prevalence of 'management pedagogies' (Giroux, 2004) in which 'knowledge is broken down into discrete parts, standardised for easier management and consumption and measured through predefined forms of assessment' (p. 208) and where the notions of educational success are largely informed by 'credentialist and materialist goals' (Woo, 2008).
Summary of chapter

This chapter examined students' perceptions of critical thinking. The two main emergent themes from the relevant data which address the final research question are:

- Classroom experiences shape students' perceptions of critical thinking
- Systemic and contextual practices shape students' perceptions

Following the discussions of the study's findings in this chapter and Chapters 4 and 5, the study shows that both teachers and students are impacted by similar contextual and systemic factors — teaching and learning practices do not occur in isolation. The larger contextual and systemic factors identified ultimately influence the manner and extent to which critical thinking is perceived, implemented and manifested in the classroom.

In the final chapter, I revisit the research aims and questions and summarise the study's findings. The conclusions in light of the findings are also discussed and a number of recommendations that could refine the critical thinking thrust under the policy are proposed.
CHAPTER 7

RETHINKING THINKING SCHOOLS, LEARNING NATION

Introduction

This chapter revisits the research questions and summarises the study’s findings. In continuing the dialogue that this qualitative study initiated, I also offer recommendations in light of the TSLN educational policy and its emergent pertinent issues and suggest some directions for future research. In closing, I offer my final reflections as the researcher in this study. More broadly, this chapter presents what Walcott (2009) describes simply as ‘what has been attempted, what has been learned, and what new questions have been raised’ (p. 114) in light of ‘the argument, story, narrative’ (Peshkin, 2000, p. 8) that have been interwoven in Chapters 4, 5 and 6. In the context of the study, this endeavour ultimately calls for the ‘rethinking’ of the Thinking Schools, Learning Nation critical thinking policy thrust.

Revisiting the research questions and study’s findings

The impetus of this research stemmed from my professional and personal concerns. My teaching experiences in Singapore suggested that the majority of students even at the final phase of Singaporean education — the pre-university stage — still lacked critical thinking skills and dispositions. This is despite the fact that TSLN, which emphasizes critical thinking in schools as one of its four key policy thrusts, has been implemented for 10 years. I pointed to the matters at stake in Singapore’s laudable initiative of reforming its educational system to better prepare its nation to meet the challenges of the new world and suggested that the critical thinking thrust does not appear to be effectively realized. Apart from my teaching experience with pre-university, or junior college, students, there are suggestions by other scholars (e.g. Gopinathan, 2007; Tan, 2007) that the critical thinking thrust is not being realized and, in my view, even marginalised in Singapore’s evolving educational narratives.
I acknowledged that while the issue can be examined in a number of ways, this study was undertaken from the perspectives of teachers and students. Although students' voices have been lacking in the larger educational research literature (Lincoln, 1995; Rudduck, 2007; Rudduck & Flutter, 2000, 2004), in the Singaporean context of this study, the intention was to hear both the voices of teachers and students which have been notably marginalised in Singaporean educational research (Liew, 2008). Given that the role of the teacher in any educational change is key (Darling-Hammond, 2000; Fullan, 1993, 2001; 2003; Hargreaves, 1992) and relationships between teacher knowledge and actions, and student behaviour and outcomes are reciprocal (Clark & Peterson, 1990; Grant, 1996; Hargreaves, 1994), the examination of the research issue from the understandings and perceptions of teachers and students is most pertinent.

In gaining insights into teachers' and students' perspectives of the implementation of the critical thinking thrust under the TSLN policy, 10 years after its inception, a qualitative case study approach was employed. This involved six government school teachers and their students and data were gathered through lesson observations, interviews, and the analyses of documents. The research questions are revisited and their respective findings are summarised as follows:

*Research Question 1: What are teachers' perceptions and knowledge base of critical thinking?*

**Gaps and uncertainties in teachers' knowledge base**

Teachers' conceptions of critical thinking are limited to the skills dimension or cognitive view of critical thinking. Despite teachers' varying classroom teaching experience, all of them expressed a similar sense of efficacy in terms of their knowledge base of critical thinking — that is, a moderate level of efficacy as none saw themselves as 'experts' or 'novices'. Thus, experience does not necessarily develop their CTPCK (critical thinking pedagogical content knowledge), unlike PCK (pedagogical content knowledge). Moreover, their knowledge base of critical thinking is also shown to be a product of their own intuition rather than that which resulted from a
systematic and explicit development either during teacher education or professional development.

Contextual and systemic factors shape teachers' knowledge base
Findings suggest that there are a number of factors that are attributable in the shaping of teachers' knowledge base. These are the tangential role of teacher education and professional development, teachers' schooling and teaching experiences, and personal reflections.

Tangential role of teacher education and professional development
The role of teacher education and professional development in the acquisition of teachers' understandings and knowledge base of critical thinking are shown to be tangential and piecemeal, rather than targeted and structured for all the teachers. This seems to account for the gaps and uncertainties in teachers' knowledge base of critical thinking.

Schooling and teaching experiences and personal reflections
In the absence of elements in teacher education and professional development that systematically and coherently develop teachers' knowledge base, the sources of their knowledge are their own schooling and classroom teaching experiences and personal reflections. These factors appear to account for why much of the teachers' knowledge base of critical thinking is the product of their intuition.

Critical thinking knowledge base enrichment through shared and situated learning
Although the teachers claimed that teacher education and professional development have not directly and explicitly developed their knowledge base of critical thinking, they unanimously expressed that professional development and shared learning among peers can be effective means to enrich this knowledge base. However, to make a significant difference in their knowledge base of critical thinking, teachers stated that such development and learning should be situated in classroom experiences and have direct applications to their subject teaching. Therefore, teachers' learning in the
context of teaching critical thinking also needs to be contextualized in and tailored to their classroom experiences, indicating that CTPCK, like PCK, is rooted and developed in practice.

Research Question 2: How and to what extent do teachers implement critical thinking?

Teachers' knowledge base shapes teachers' practice
Teachers' incorporation of critical thinking in their teaching, or attempts to do so, suggests the manner and extent to which teachers incorporate critical thinking are shaped by their respective knowledge base and understandings of critical thinking.

 Peripheral role of critical thinking in teaching
The role of developing students' critical thinking in lessons is a secondary objective and largely limited during teaching. For most teachers, incorporating critical thinking is done in an intuitive and impromptu fashion, rather than deliberate and structured. This consequently casts critical thinking in a peripheral role during normal lessons in which it is subservient to other priorities.

Limited and unstructured implementation
The findings also indicate that the implementation of critical thinking, largely assuming a secondary role in regular teaching and lesson planning, generally occurred in a superficial and unstructured manner. And, in terms of their approach, teachers' efforts at implementing critical thinking can be described as modelling the immersion approach, albeit this does not appear to be a conscious and deliberate act on their part.

The limited and unstructured implementation of critical thinking in the daily classroom can be attributed to the gaps and uncertainties in teachers' knowledge base of critical thinking. This lack of knowledge which manifests itself in the superficial and intuitive incorporation of critical thinking in the classroom is corroborated by teachers' candid comments. The lack of CTK (critical thinking knowledge) and CTPK (critical thinking pedagogical
knowledge) constrains them from incorporating critical thinking more effectively and liberally during teaching.

**Questioning as the primary means of implementing critical thinking**

All the teachers see questioning as their primary strategy of implementing critical thinking and for most, their only strategy. However, the range and types of questions vary among teachers. Some teachers' questions can be largely described as engaging students' critical thinking, as evidenced by their use of Socratic questions (e.g. Sean, Ivan and Evelyn). Others, however, tend to be verification and closed questions which are primarily aimed at assessing student content understanding, rather than promoting and developing students' critical thinking (e.g. Nathan, Yvonne and Roy).

Other strategies of incorporating critical thinking for some teachers include co-operative learning and metacognitive reflections activities such as student reflections of class work done, notably in the cases of Roy and Evelyn respectively. Lesson observations indicate that the extent of classroom thoughtfulness varies greatly among teachers. Teachers who teach subjects that expressively demand students' to think critically, such as General Paper and English Literature at pre-university level (e.g. Sean and Evelyn) incorporate relatively more elements of classroom thoughtfulness such as raising challenging questions, structuring challenging tasks and teachers pressing students to justify their assertions and opinions. This is in contrast to the teachers who teach at secondary and primary level.

**Contextual and systemic factors shape teachers' practice**

Apart from the teachers' knowledge base of critical thinking, findings suggest that contextual and systemic factors also impede teachers' efforts at incorporating critical thinking in the classroom. These interrelated factors consequently manifest in the limited and unstructured implementation of critical thinking and are identified as: the constraints of time; the need to cover content and prepare students for examination; students' abilities and attitude; policies and the school context; and conflicted teachers' beliefs.
The need to cover content and prepare students for examinations, which are exacerbated by time constraints and perceived students' weaknesses, compromise teachers' efforts to implement critical thinking in the classroom. Interestingly, content coverage of the revised curriculum and examinations are not perceived to serve and prioritize concomitantly the aim of developing students' critical thinking. Together, they are not viewed to be the vehicle that realize TSLN's emphasis on critical thinking in the classroom, but instead perceived as a hindrance in most cases. The revised curriculum under TSLN which aims to emphasize critical thinking in schools paradoxically compels teachers to emphasize content coverage instead, marginalising the development of students' critical thinking.

Furthermore, school and ministerial policies and initiatives, which are not seen as factors that encourage the development of students' critical thinking, are perceived as barriers to the emphasis of critical thinking in classrooms. This is illustrated by the lack of school policies that explicitly encourage and support the implementation of critical thinking. Despite the ministerial exhortations, the school and the larger educational context (e.g. teacher education and professional learning programmes and school policies) have not systematically attended to the preparation of teachers in terms of their knowledge base or prioritized the emphasis on critical thinking in practice.

Research Question 3: What are students' perceptions of critical thinking?

Classroom experiences shape students' perceptions of critical thinking
Pre-university and secondary students perceived that critical thinking plays a marginal and narrow role in much of their schooling and learning process. To a great extent, the findings suggest that there is a lack of emphasis on the development of critical thinking in lessons and, thus, very limited implementation, especially during secondary school education.

Furthermore, pre-university students view that critical thinking occurs most frequently in the Language Arts subjects such as General Paper and English Literature as opposed to Science and Mathematics. Their perceptions corroborate the teachers' experiences that indicate the peripheral and
secondary role of critical thinking in their teaching, illustrating that the reciprocal links between teachers' behaviours and actions on students' perceptions (Clark & Peterson, 1990; Fullan, 2001; Hargreaves, 1992) are also existent in the context of implementing critical thinking in the classroom.

**Systemic and contextual practices shape students' perceptions of critical thinking**

*Emphasis on rote learning and examination preparation*

Pre-university and upper secondary students attribute their perceptions of the marginal role critical thinking plays in their learning to prevailing contextual and systemic practices. Data indicate that their perceptions have been greatly shaped by their teachers’ actions. In addition, pre-university students point to entrenched practices that they recognise are inherent in the Singaporean educational system. These practices include the emphasis on rote learning, examination preparation and content coverage. Thus, pre-university and secondary school students see learning in school and preparing for assessments as being very much about rote learning and memorising, rather than thinking critically and understanding.

**Rigidity and structuredness in the educational system**

Findings also indicate that pre-university students' perceptions of critical thinking and learning are a consequence of the educational system which is perceived to be 'rigid' and 'structured'. These inherent features in the system are seen by pre-university university students as a constraint on the development of their critical thinking and consequently shape their perceptions of its marginal role in their learning. The overwhelming sense of structuredness and rigidity is an impediment to the development and encouragement of students' critical thinking. Students remarked that this sense of rigidity and structuredness is inherent in assessment objectives and even in subjects that are perceived to patently involve critical thinking such as General Paper and English Literature. They also observed that these elements are present in the teaching and learning culture and in the systemic emphasis on examination.
'Practical' attitudes and time constraints

Next to the systemic emphasis on rote learning and examination preparation, pre-university and secondary school students and the teachers expressed that time is the curtailling factor in the efforts to promote and develop students' critical thinking in the classroom. Time constraints are seen to restrict student opportunities to think critically during lessons and such pressures are perceived as counter-productive to students' attempts to think critically. These constraints consequently shape students' 'practical' attitude towards the role of critical thinking in schooling and learning. This is where the aim of developing critical thinking is seen as peripheral and secondary against the pragmatic need to cover content and prepare for high stake examinations and in the subsequent fulfilment of 'credentialist and materialist goals' (Woo, 2008). As illustrated by student remarks, such perceptions are also filtered down to them from teachers' pragmatic attitudes towards the role of critical thinking in the classroom.

**Students' low sense of efficacy as 'thinking learners'**

Students who have practically received all of their education since the implementation of TSLN (i.e. upper secondary and pre-university students) describe themselves as far from being developed as 'thinking learners' as aspired under the policy. The majority of students point to the lack of emphasis and development of critical thinking and learning habits during the earlier levels of schooling. Others suggest that the significant encouragement and development of their critical thinking only occurs with subjects such as General Paper and English Literature at pre-university level; without which some would have felt more inadequate as 'thinking learners'.

**Encouraging and nurturing students' critical thinking**

Contextual and systemic practices can also aid in the development of students' critical thinking. This is when pedagogical practices are designed and aimed to engage students' interests and are constructivist and dialogic, rather than didactic. Students indicate that such practices not only tap into
their academic interests, but also their inclinations for pedagogies that are student-centred and actively engage their critical thinking.

Rethinking *Thinking Schools, Learning Nation*

Teachers’ and students’ perceptions of critical thinking under TSLN in this study echo each other. Their voices — which are in unison with one another — not only suggest their corresponding realities and experiences, but provide data triangulation for the findings. As a whole, they also offer further evidence that the dynamics of teaching and learning in the classroom do not exist in a vacuum — what transpires in the classroom is also subject to external forces and factors.

Clark (2003) suggests that 'schools and classrooms are the locus of social, psychological, physical, political, and metaphysical action, embedded in the world and affected by it' (p. 216). In advancing our understanding of teacher and student thinking and their implications, he also suggests that we must 'think more synthetically and holistically about context' (p. 216). Therefore, in avoiding the 'narrow parochialism' found in the view of 'the teacher as the source, linchpin, and dynamo of education', this study recognises the presence of the other 'powerful forces and constraints that shape and influence schooling' (Clark, 2003, p. 219) and thus, has placed 'attention on the larger contextual forces that influence them and the entire system of education' (Clark, 2003, p. 220).

This study primarily argues that teachers’ knowledge and practice and students’ perceptions in the context of implementing critical thinking are enmeshed with and subject to the larger systemic and contextual factors that frame them. These attendant factors also impact teachers' and students' pedagogical discourses. Figure 17 summarily conceptualises these various dynamics and factors that impinge on Singaporean schooling and the resultant discourses of the teachers and students, and the reciprocal links among them. In this light, any recommendations that hope to bring change must therefore take into account the interconnectedness between and among factors, agents and processes in education.
Technocratic and instrumental rationalities: education as serving and furthering national economic and social imperatives rather than the humanistic and emancipatory imperative.

Political and socio-cultural forces: forces that stem from Singapore's political and socio-cultural milieu.

Systemic factors: curriculum hegemony, mandated examinations, high stakes testing, time, policies.

Contextual factors: students' attitudes and abilities, the school, teachers' beliefs and parents' attitude.

Teachers' pedagogical knowledge discourse: gaps and uncertainties in the knowledge base of critical thinking (i.e. critical thinking knowledge, critical thinking pedagogical knowledge and critical thinking pedagogical content knowledge), pedagogical content knowledge (i.e. content knowledge, context knowledge, pedagogical knowledge), knowledge of curriculum.

Teachers' pedagogical practice discourse: limited pedagogy and practice of critical thinking in the classroom.

Students' pedagogical discourse: perceptions of the marginal role of critical thinking in learning, the varying emphases of critical thinking in different subjects, rote-learning, pragmatic attitudes and learning culture.

Figure 17: The factors impacting Singaporean schooling and teachers' and students' discourse of critical thinking in TSLN
Ignoring the holistic nature of education — as the figure suggests — in effecting change in education is done at one's peril. Fullan (1993) warns of its consequence:

If concerns for making a difference remain at the one-to-one and classroom level, it cannot be done ... making a difference, must be explicitly recast in broader social and moral terms. It must be seen that one cannot make a difference at the interpersonal level unless the problem and solution are enlarged to encompass the conditions that surround teaching, and the skills and actions that would be needed to make a difference. Without this additional and broader dimension the best of teachers will end up as moral martyrs. (p.11)

**Defining change in Thinking Schools, Learning Nation 10 years on**

Change is not an event. Rather, it is a process which is not 'unidimensional' (Bowe, Ball & Gold, 1992), but 'multidimensional' and 'occurs in practice' (Fullan, 2001). In educational change, three dimensions could be seen to be essential in effecting significant change. These are the: use of new instructional resources (e.g. curriculum materials and technologies); use of new teaching approaches (e.g. new teaching strategies or activities); and alteration of beliefs (e.g. pedagogical assumptions and theories underlying particular new policies or programmes) (Fullan, 2001, p. 39).

Consistent with Deng and Gopinathan's (2005) use of these dimensions of change in their analysis of Singapore’s Information Technology (IT) Masterplan in TSLN, the dimensions here can also be instructive in understanding and articulating the kind of change that has occurred under TSLN’s policy of emphasizing critical thinking in schools. While certain initiatives such as the TSLN IT policy thrust and the revision of the curriculum have provided new instructional resources and curriculum materials, it cannot be said that there has been a corresponding change in teaching approaches and an alteration of teacher beliefs.

This study indicates that the state of teachers’ knowledge base and enactment of critical thinking and a multitude of larger systemic and
contextual factors remain major barriers to the realisation of TSLN critical thinking thrust, 10 years after its inception. The development of critical thinking by and large assumed not only a secondary role in teaching, but its lack of emphasis and marginal role in the curriculum in which rote learning and ‘didactism’ are still largely prevalent are also perceived by students. Collectively, these findings suggest that there is a profound disconnect of TSLN critical thinking thrust between ministerial level exhortations and school and classroom level implementation. From teachers’ and students’ perspectives, the evidence is that the effective concretisation of TSLN’s critical thinking thrust is lacking where it should matter most — on the ground and on the frontlines of teaching and learning, which is the classroom.

And, as the study illustrates, significant changes in TSLN need to be informed by a fourth dimension — teacher knowledge. Without the knowledge dimension to inform and equip them, teachers are not in the position to effect the desired pedagogical changes, especially when larger and contextual factors compound their circumstances. Therefore in light of the findings, the study contends that instead of ‘deep change’, there only is ‘surface change’ (Fullan, 2000) in the implementation of TSLN’s critical thinking thrust.

Reculturing and the reorientation of ‘policy technologies’

To effect deep change and realize the central aspiration of ‘thinking learners’ who are equipped with the core thinking skills and processes and thinking dispositions as aspired in TSLN, there must not only be restructuring but, importantly, reculturing (Boyd, 2000; Fink & Stoll, 2005; Fullan, 2003; Miller, 2005) in which ‘institutional practices must be challenged and changed’ (Bowe et al., 1992, p. 142). While restructuring appears to have been occurring, reculturing — the process of adopting new values, beliefs and norms (Boyd, 2000; Fullan, 1996) — perhaps, has not. Although new structures have clearly been put in place, illustrated, for instance, by the successful implementation of the IT Masterplan (MOE, 2008b) across schools as part of TSLN, the reculturation of key educational agents manning these new structures have yet to occur.
Paul (1995) particularly points to the psychological challenge of making the appropriate changes towards critical thinking.

What is worthwhile in education and life is never easy: no one ever legitimately claimed that critical thinking would be. Critical thinking is complex because it involves overcoming not only intellectual barriers to progress but psychological barriers as well. (p. ii)

Reculturing also calls for the reorientation of the ‘policy technologies’ behind TSLN to be in concert towards the aims of progressive education which the critical thinking objective and the development of ‘thinking learners’ entail. Ball (2003) writes that policy technologies involve the calculated deployment of techniques and artefacts to organize human forces and capabilities into functioning networks of power. Various disparate elements are inter-related within these technologies; involving architectural forms, functional tests and procedures, relations of hierarchy, strategies of motivation and mechanisms of reformation or therapy. (p. 216)

The process of reculturing needs to encompass broader dimensions and it must be seen in ‘holistic and composite terms’ (Bowe et al., 1992, p. 141) in which the policy technologies are correspondingly reoriented. New structures put in place aimed at effecting change without the concomitant reculturation of agents operating behind and within these structures, and the orientation of the attendant policy technologies could only lead back to the path of surface change. Thus, reculturing must also occur across the different levels of the educational system because the failure of educational change cannot be viewed as an isolated individual problem at teacher level (Bowe et al., 1992; Bascia & Hargreaves, 2000), but also the result of larger systemic and contextual factors as this research demonstrates. Moreover,

[r]eculturing ... seeks to find the ecological connections among the purposes of education, the organizational values of schools, as well as its structures, cultures, leadership, and the work and lives of teachers. (Fink & Stoll, 2005, p. 38)
Perhaps, the absence of reculturation and policy technologies that are geared to the fulfilment of the critical thinking thrust could explain why in spite of ministerial proclamations and the restructuring that have taken place, scholarly observations (Gopinathan, 2007; Tan, 2007) and the findings in the study suggest that the critical thinking objective is not being met 10 years on. To use a familiar phrase for the present context of educational change: ‘some things seem to have been lost in translation’.

*Developing teachers’ knowledge base and reconceptualising teachers and teaching*

Educational change has to be accompanied by teacher education and professional development (Bascia, 2005; Cochran-Smith, 2005; Fullan, 2001, 2003). However, the findings illustrate that teacher education and professional development have not adequately prepared teachers for the transformation needed in terms of their knowledge base in coping with the pedagogical changes expected under TSLN.

Preparing teachers to teach in a curriculum that explicitly emphasizes critical thinking involves more than just developing their PCK. More, specifically, as the study suggests, it involves developing their CTPCK (critical thinking pedagogical content knowledge) in which this knowledge entails the declarative, procedural and conditional knowledge of critical thinking — knowing what critical thinking is, knowing how and when to apply and integrate it in teaching subject matter effectively. In other words, teachers need to possess critical thinking knowledge (CTK), critical thinking pedagogical knowledge (CTPK), critical thinking content knowledge (CTCK) and, ultimately, critical thinking pedagogical content knowledge (CTPCK) — these concepts are fully explicated in the *Contributions to the field* section.

The development of teachers’ CTPCK must begin at the teacher education phase. This calls for a coherent and systematic approach in developing the knowledge base of critical thinking. Through core modules, for instance, teachers’ need to be exposed to different theories on critical thinking and teaching strategies, and also engage in discourses that challenge their
assumptions about teaching and learning and the role and aim of thinking (Onosko et al., 1990). Putting the key foundations of the teachers' knowledge base of critical thinking during teacher education is fundamental. Without adequate foundations, the knowledge base may not fully benefit from subsequent teaching experience and reflections rooted in practice which enrich and develop CTPCK.

Moreover, the enterprise of developing thinking students requires the development of thinking teachers (Dewey, 1977; Duffy, 1994; Martin & Michelli, 2001; Page, 2004; Tishman, Jay & Perkins, 1995; Ritchhart, 2002) or teachers as 'intellectuals' — 'transformative intellectuals' (Giroux, 1984, 1985, 2004). That is, instead of merely being seen as

performers professionally equipped to realize effectively any goals that may be set for them... [They should be viewed] as free men and women with a special dedication to the values of the intellect and the critical enhancement of the young. (Scheffler, 1968, p. 11)

This reconceptualisation of teachers necessitates that the process of educating them is a dialectical and dialogical (Paul, 1995) one, as discussed in Chapter 2, in which the cultural forces that engender a thinking culture (Ritchhart, 2002) are present, and where teachers also develop a 'critical voice' — that is, 'to be able to think critically ... and look at messages and materials through different lenses and from many perspectives ... pull apart materials, sort them, question them...' (Page, 2004, p. 219). This is where the redesigning of the pedagogy of teacher education calls for the creation of both 'intellectual communities' (Onosko & Newmann, 1994) and 'communities of practice' (Lave, 1991; Wenger, 1998) from the very first phase of a teacher's career — teacher education. The aim behind these recommendations is the development of teachers as transformative intellectuals with thinking dispositions, behaviours and 'mental models of thinking' (Ritchhart, 2002) that are consistent with constructivist pedagogies — all of which are fundamental in effectively fulfilling TSLN's critical thinking thrust — and Dewey's (1977) original call for the need to educate teachers to be intellectuals at the beginning of the 20th century.
Incorporating teachers’ voices in teacher development and educational change

Professional development initiatives that have been implemented since the beginning of the TSLN era seem to reflect conventional wisdom (Hairon, 2008). Landmark initiatives such as the establishment of Teachers’ Network and the Enhanced Performance Management System are consistent with current key tenets and assumptions guiding professional development in literature. Hairon (2008) concurs that the various initiatives implemented seem to embrace notions of diversity, life-long learning, collaboration, situated learning, reflective practice and having to connect professional learning with student outcomes which have been advocated in the literature (e.g. Day & Sachs, 2004; Guskey, 2000; Garet et al., 2001; Putnam & Borko, 2000; Loughran, 2005).

However, as Hairon (2008) points out, the time constraints and pragmatic attitudes prevent teachers and schools from reaping the full benefits of the initiatives. Schools and teachers under time pressures, for instance, marginalize coherent professional development programmes. This is also where the need for and provision of professional learning is seen more as the fulfilment of mandated targets rather than for genuine professional enrichment and growth.

Literature suggests that to make profession development effective, teachers need to assume a more central role (Ball, 1996; Bascia & Hargreaves, 2000; Day & Sachs, 2004; Fullan, 2001). This includes giving teachers autonomy in charting and dictating their own learning journey. However, while Hairon (2008) similarly advocates providing teachers with greater autonomy, in the context of TSLN, I would suggest that the underlying problem is in the way teachers in Singapore have been largely conceptualised in practice — as

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7 a dedicated organization which specifically aims at developing reflective teachers and supporting their professional learning established in 1998

8 a comprehensive framework that develops and assesses teacher competencies mandated and implemented by MOE in 2001
technicians (Bascia & Hargreaves, 2000). This is especially so in an educational system that is predisposed by underlying ‘technocratic and instrumental rationalities’ (Giroux, 2003, p. 207). It is also one which is examination and standards driven and breeds pragmatic attitudes that are possibly driven by ‘credentialist and materialistic goals’ (Woo, 2008), as the study illustrates.

For professional education and development to be effective, I suggest there has to be a systematic and systemic reconceptualisation of teaching as more than just a technical enterprise but as intellectual work (Bascia & Hargreaves, 2000; Giroux, 1984, 1985, 2004). For instance, there should an express recognition by school leadership at district and ministerial level that teachers must chart their own professional education and development, rather than be prescribed by larger organisational agendas; teaching is more than just ‘doing’, it is also ‘thinking’. This call is consistent with TSLN’s need for ‘thinking teachers who are continuously learning and growing professionally and always seeking new and better ways to improve their practice’ (MOE, 2006).

Teacher education in the cases of the teachers in the study seems to have been informed by the ‘technocratic and instrumental rationalities’ (Giroux, 2003) which are reflected in the underpinning pragmatic and meritocratic tenets of Singaporean education (Ho & Gopinathan, 1999). Thus, while the aim of developing ‘thinking learners’ is in essence progressive, teacher education has not been tailored correspondingly, or founded on the requisite assumptions of teachers and teaching. Thus, for teachers to be developed as ‘thinking teachers’ with the necessary dispositions that can, in turn, develop ‘thinking learners’

[...]teacher development ... must actively listen to and sponsor the teacher’s voice; establish opportunities for teachers to confront the assumptions and beliefs underlying their practices; avoid faddism and blanket implementation of favoured new instructional practices; and create a community of teachers who discuss and develop their purposes over time. (Fullan & Hargreaves, 1992, p. 5)
If teachers are in effect accorded with the ‘transformative’ task of developing tomorrow’s ‘thinking citizens’ under TSLN, which Singapore sees as crucial in its survival and prosperity (Goh, 1997), then they must correspondingly be seen as ‘intellectuals’ — ‘transformative intellectuals’ (Giroux, 1985, 1988, 2004). This calls for a departure from a behaviouristic paradigm to a more progressive one which sees teachers not as technicians who merely execute pre-determined curricula, but as intellectuals who also interrogate them. In agreement with Hairon’s (2008) call, only with such a genuine sense of empowerment can professional education and development in the TSLN era have a meaningful connection as teachers chart and propose their own professional development.

Thus, the continued development of teachers’ CTPCK, which is emergent and dynamic, during the in-service phase is to be primarily dictated by teachers. Rather than professional learning and development being prescribed externally, these instead must be informed by the aggregate of teachers’ own professional reflections, accrued practical experience and wisdom, and dialogues within and among themselves in ‘communities of practice’ (Lave, 1991; Wenger, 1998). Hence, any collaboration with expert staff developers must be a collaboration of ‘outsiders’ expertise’ and ‘insiders’ experience’ (Barnet & Hodson, 1999).

Furthermore, if educational change boils down ultimately to ‘what teachers do and think’ (Fullan, 1993, 2001), then teachers (not their proxies) must play a prominent part in the discourses of educational change for the change to be effective. For instance, the teachers’ union can be accorded an active role in review committees or panels together with other key stakeholders. If change is to be enduring and have a globalized instead of a localized effect in the educational system, then teachers must be among those at the forefront of educational reforms (Bascia & Hargreaves, 2000) and curriculum design. The significance of making teachers key agents in such processes is emphasized by Bascia and Hargreaves (2000):

Educational change must connect teachers to the system and society in an activist way, where they can see themselves not just as
effects of the context, but as part of the context, contributors to it, and as agents who can and must influence how others perceive, shape and support their work. (p. 20)

Creating conducive contexts and curriculum

The aim of developing critical thinking also logically calls for contexts that support this very aim. As this study suggests, for teachers and students to make critical thinking a significant part of teaching and learning, they need schools and a curriculum that explicitly encourage, value, reward and assess such thinking, and engender a culture of thinking (Ritchhart, 2002). This can come in the shape of explicit school policies, initiatives and assessments that are consistent with the purpose of developing ‘thinking learners’, and not merely with emphasis and attainment of standards.

In other words, schools, being the immediate environment and context for teachers and students, must provide and manage an ‘intellectual ecology’ and a ‘climate of thinking’ (Costa, 1985, 2001b). This is where cultural forces which exist shape the desired thinking dispositions that define the intellectual character (Ritchhart, 2002) of students and teachers. And in this enterprise as with any educational initiative, it is, undoubtedly, the school culture and environment that will play a significant factor in leading the way.

Mitigating and negotiating paradigmatic tensions in Singaporean education

The process of reculturation that the aforementioned recommendations above seek, however, need to be mitigated and negotiated amidst various tensions — both practical and philosophical — inherent in the Singaporean educational system. The practical tensions that are engendered by the growing marketisation of Singaporean schools, which are informed by the ‘technocratic and instrumental rationalities’ that govern Singapore’s larger political and socio-cultural context, lead to what Giroux (2003) describes as the ‘proletarianization of teachers’ work’ which is

the tendency to reduce teachers to the status of specialized technicians within school bureaucracy, whose function then
becomes one of managing and implementing curricula programs rather than developing or critically appropriating curricula to fit specific pedagogical concerns. (p. 206)

Furthermore, these prevalent rationalities compound teachers in a culture of ‘performativity’ in Singaporean education (Tan, 2008). Ball (2004) describes performativity as

a technology, a culture, and a mode of regulation that employs judgments, comparisons and displays as means of control, attrition and change. The performances of — individual subjects or organizations — serve as measures of productivity or output, or displays of ‘quality’, or ‘moments’ of promotion or inspection. They stand for, encapsulate or represent the worth, quality or value of an individual or organization within a field of judgment. (p. 143)

The School Excellence Model (SEM), which is a benchmark for schools to account and appraise themselves and in relation to other schools, embodies such a culture, perpetuating the proletarianization and ‘deskilling’ of teachers (Giroux, 1985, 2004). As part of TSLN initiatives of developing excellent schools, this model undoubtedly provides a tool for schools to assess their strengths and areas for improvement. However, the quantifiable nature of SEM in the shape of Key Performance Indicators (KPIs) and other criteria and evidence seem to preclude the development of critical thinking and compel the work of teaching as technical performance. An excellent school under SEM is

one in which the leaders lead staff, devise strategies and deploy resources, all of which are systematically fed into clearly identified student-focused processes for which targets are set and performance monitored and managed. (Ng, 2003, p. 29)

Given this definition of an excellent school, the development of students’ critical thinking appears to be a mere humanistic aim in the face of other ‘measurables’ and performativity indicators such as examination performances and awards. This is especially so when the development of
students' critical thinking is not an explicit aim of student processes and outcomes.

In the need to achieve measurables and performativity indicators, the development of students' critical thinking, as shown in this study, is compromised given its lack of emphasis. Until the development of students' critical thinking and dispositions is explicitly constituted as part of schools criteria to benchmark their strengths and areas for improvement, TSLN's aim of emphasizing critical thinking is seen to manifest as a tension in the educational system. More specifically, it becomes a pedagogical quandary for teachers between the practical aim of fulfilling measurables in the culture of performativity and the humanistic and emancipatory aim of developing critical thinking in students. It is apparent that 'the language of management and efficiency' (Giroux, 2004, p. 207) that is still pervasive in Singaporean education and dominates its narratives is inconsistent with the aim of developing 'thinking learners' (CPDD, 1998), and reifies the view of teachers as technicians and 'performers', and not as 'transformative intellectuals' (Giroux, 1984, 1985, 2004).

However, this tension is also exacerbated by a larger philosophical one. That is, one which stems from the apparent clash between the traditional pragmatist tenets that have guided Singaporean education (Tan, 2006a) and the contemporary progressive education elements that are intrinsic in TSLN. On the one hand, Singaporean education has always been driven by the pragmatist need to serve the national economic and social agenda (Ho & Gopinathan, 1999; Tan, 2007; Tan, 2006a). On the other hand, progressive education elements in TSLN call for the reorientation of learners as the centre of educational discourse and change rather than national economic imperatives.

There is no criticism intended against serving this dual need. However, the study's findings indicate that when such tensions exist, pragmatism triumphs, leaving the aim of developing students' critical thinking merely as the ideal and desirable state of affairs, classroom realities and pragmatism notwithstanding.
I am not suggesting that addressing this tension is necessarily the case of prioritizing one over the other. Rather, the point is that until ministerial exhortations on constructivist and progressive education are commensurate with the underlying rationalities of Singaporean education and the realities of the classroom and the school, and vice versa (and thus reoriented accordingly), the tension manifests in the disconnect between the two quarters. Perhaps, in the Singaporean context of developing thinking citizens through TSLN, ‘educational policy [is finding] itself at the centre of a major political struggle, between those who see it only for its instrumental outcomes, and those who see its potential for human emancipation’ (Taylor, Rizvi, Lingard & Henry, 1997, p. vii). As I argue in this study, all these tensions impact teachers’ knowledge base and practice, and students’ perceptions of critical thinking. Consequently, unless these tensions are mediated, they leave teachers on the ‘sharp edge of educational change’ (Bascia & Hargreaves, 2000, p. 3) and in the ‘crossfire’.

Contributions to the field

In the Singaporean context, the contributions to the field can be seen in the following ways. First, the study provides an insight into the implementation of the TSLN policy critical thinking thrust from the perspectives of teachers and students. It is through the perspectives of these key agents of education that any workings of educational initiatives and reform can be properly understood. Their perspectives provide an insight into the realities from the coalface of education.

Therefore, in making teachers the focal point, I responded to Tan’s (2002) call that ‘greater attention needs to be focused on the human aspects, such as teachers’ beliefs about knowledge and their role as teachers’ (p. 155) in the study of the implementation of educational initiatives such as TSLN. In doing so, the study eschewed the technical aspects and instead centred on the experiences of the human elements in the educational system, which are removed from the regular discourses of performativity of SEMs (School Excellence Model) and KPIs (key performance indicators). Thus, this study provides the humanistic dimension of the implementation of TSLN.
Concomitantly, given that the study examined the research problem from the perspectives of teachers and students, it thus conveys their voices — voices that have often been silenced and marginalized in much Singaporean educational research (Liew, 2008). In studying the problem from teachers' and students' perspectives, the aim to acquire understandings and insights from the 'ground' and 'swampy lowlands' (Schön, 1983) of education that at times seemed distant from the 'ivory towers' of policymakers is also served.

The study also makes a contribution to a perceived gap in the literature by combining fields of research which at the time of the research are not known to have been conducted previously in the Singaporean context — critical thinking and teacher knowledge. In combining the domains of critical thinking and teacher knowledge, it also makes a contribution to these two respective fields in Singaporean educational research and thus provides an insight into the articulation between teacher knowledge and teacher practice in the context of teaching critical thinking under TSLN. In the course of this, it also incorporates students' voices in the discourse of the TSLN policy.

On an international level, the study contributes to the currently limited body of knowledge on the combined areas of teacher knowledge and critical thinking, contributing further insights into the issue of teacher knowledge in the context of implementing thinking curricula. That is, insights into what teachers need (in terms of supportive external factors) and need to know (in terms of their knowledge and dispositions) in the effective implementation of a critical thinking programme or curriculum.

In this regard, the study also makes a theoretical contribution to the study of teacher knowledge. This, namely, is in the shape of the emergent notion of CTPCK — critical thinking pedagogical content knowledge — as an alternative heuristic and analytical tool in the study of teacher knowledge. The CTPCK framework used as an analytical tool in this study offers a new way of seeing the teacher knowledge base in the context of thinking curricula — that is, as the synthesis of knowledge domains such as critical thinking knowledge (CTK), critical thinking content knowledge (CTCK), critical thinking pedagogical knowledge (CTPK), and pedagogical content knowledge (PCK),
which together form the specialised blend of knowledge which is the preserve of teachers. Based on Mishra and Koehler’s (2006) notion of technological pedagogical content knowledge (TPCK) (see Mishra & Koehler, 2006), Figure 18 conceptualises this critical thinking knowledge base whose domains are now presented and defined accordingly. As with PCK in which the content knowledge (CK) component is essential, the study suggests that a sound CTPCK also requires a sound CTK. Without this declarative knowledge (i.e. CTK) to inform the conditional and procedural knowledge domains (i.e. CTPK, CTCK and CTPCK), it is argued that teaching critical thinking cannot take place effectively.

Figure 18: The interaction and overlaps of CK, PK, and PCK and CTK result in an emergent knowledge domain, CTPCK (CTPCK) — adapted from Mishra & Koehler (2006)

Critical thinking knowledge (CTK)
CTK is knowledge of explicit theories and conceptions of critical thinking (e.g. Ennis, 1991; Facione, 2006; Paul, 1995) and/or of thinking frameworks such as Marzano’s (1988, 1992) DoL and DoT. This knowledge includes
knowledge of critical thinking skills and/or processes (e.g. in Beyer, 2001; Marzano et al., 1988) thinking dispositions (e.g. in Ennis, 1991; Ritchhart, 2002; Tishman et al., 1995) and intellectual standards (e.g. Paul, 1995; Bailin et al., 1999). In sum, CTK relates to the declarative knowledge (knowing that) aspect or the ‘what’ of critical thinking and is seen as analogous to the notion of CK.

**Critical thinking content knowledge (CTCK)**

CTCK includes the knowledge of the application of various critical thinking teaching strategies and pedagogies (i.e. procedural and conditional knowledge). But it also entails the knowledge of how the applications of these strategies can suit the subject matter taught. It is knowledge about the way in which the development of student critical thinking and content are reciprocally linked.

**Critical thinking pedagogical knowledge (CTPK)**

CTPK refers to the knowledge of the existence of the pedagogies, strategies and approaches to teaching critical thinking as they are used in teaching and learning settings. Incorporating Zohar and Schwartz’s (2005) suggestions discussed in Chapter 2, this includes the knowledge of:

- ‘a variety of thinking patterns (or skills, or strategies) on a cognitive level and on a metacognitive level’;
- pedagogies ‘that would engage students extensively in tasks that require thinking skills’; and
- knowledge of how to ‘engage their students in the ‘language of thinking’, in metacognitive thinking, in transfer of thinking skills across various subjects, and in cultivating thinking dispositions’. (p. 1026)

CTPK also includes the knowledge of how to employ types of thinking routines (Ritchhart, 2002; Ritchhart & Perkins, 2008), or Socratic questioning (Paul, 1995; Paul & Elder, 2007) and powerful questions (Costa, 2001c) and frameworks and programmes such as P4C (Lipman, 1985, 2003), DoL and DoT (Marzano, 1988, 1992) or CoRT (de Bono, 1986) during teaching. CTPK also includes the knowledge of how teaching might change as a result of
using such strategies and approaches. In sum, CTPK pertains to the procedural (knowing how) and conditional knowledge (knowing why) aspect, or the 'how' aspect of critical thinking as it relates to the knowledge of the pedagogical applications of these critical thinking strategies. It is also analogous to the notion of PK.

Critical thinking pedagogical content knowledge (CTPCK)

Critical thinking pedagogical content knowledge is an emergent form of knowledge that goes beyond the components of CK, PK, PCK and CTK. This knowledge is different from knowledge of a disciplinary or critical thinking expert and also from the general pedagogical knowledge shared by teachers. Basing it on Mishra and Koehler's (2006) conceptualisation of technological pedagogical content knowledge (TPCK) which is defined as

a class of knowledge that is central to teachers' work with technology. This knowledge would not typically be held by technologically proficient subject matter experts, or by technologists who know little of the subject or of pedagogy, or by teachers who know little of that subject or about technology. (p. 1029)

CTPCK is defined as a special class of knowledge that is central to teachers' practice of critical thinking. This knowledge would not typically be held by non-teaching subject-matter experts; teachers who know little of critical thinking; professed critical thinkers who know little of the subject or of pedagogy; and teachers who know either little of that subject or critical thinking.

CTPCK, consisting of the interactions of CTK, CTCK and CTPK is argued to be the foundation of effective critical thinking instruction. As shown in the study, the CTPCK framework provides a heuristic tool in the conceptualisation of the teacher knowledge base in the context of a ‘thinking curriculum’. The importance of the incorporation of the concept of CTPCK is that it bridges the gap created by the notion of pedagogical knowledge in the context of higher-order thinking (PKHOT) (Zohar & Schwartz, 2005), as discussed in Chapter 2.
Unlike Zohar and Schwartz's (2005) notion of PKHOT, CTPCK illustrates what the teacher knowledge base in the context of teaching critical thinking entails. It is the articulation of these parts and knowledge domains, which are seen as comprising the whole, that facilitates a more holistic conceptualization of the teacher knowledge base in the context of teaching critical thinking.

If critical thinking is to be thought of as a formalised and instituted foundation of contemporary education curricula, then the reconceptualisation of the teacher knowledge base should incorporate the concept of CTPCK to better understand and develop the teacher knowledge base in the context of proliferating ‘thinking curricula’. As a more holistic notion, CTPCK also attends to the ‘the special nature’ (Zohar & Schwartz, 2005) of teacher knowledge in the context of teaching thinking. It also captures the complexities and the dynamics among the knowledge domains, as indicated in the study, which is conceived as comprising the teacher knowledge base needed in the effective fulfilment of TSLN’s critical thinking thrust, or a curriculum that explicitly emphasizes thinking.

The concept of CTPCK also offers both methodological and practical possibilities. On the one hand, it can be employed as a theoretical framework for similar future studies. On the other hand, it can also be used to inform systematically and coherently the preparation and development of teachers in thinking curricula as shown earlier, in the same way the PCK notion has informed teacher education in other international contexts (Abell, 2008) and at Singapore’s National Institute of Education based on its latest teacher preparation programme handbook (NIE, 2008). Thus, the study sees the concept of CTPCK as an important contribution to the understanding of teacher knowledge and practice in the context of curricula that explicitly emphasize the development of learner’s critical thinking.

Limitations of research

As with any study, I acknowledge that limitations — both practical and philosophical — are inherent in my research. Firstly, given that TSLN has four
key policy thrusts, my research focus is only on one of them — the emphasis on critical thinking in schools. Thus, the study is limited by its focus on this thrust and not on all the four under the TSLN policy as discussed in Chapter 2. This being the case, I undertook this qualitative case study only from the perspectives of the two most key stakeholders of education — teachers and students — and not the perspectives of other stakeholders. A consequence of this is that a sense of breadth has been sacrificed for a greater sense of depth, which is commensurate with the qualitative case study design employed (Merriam, 1998, 2009; Stake, 1995, 2005).

The inherent constraints at the research setting also prevented other research methods of data gathering to be incorporated. This included logistical constraints which would have otherwise allowed the use of alternative methods of uncovering teachers’ intrinsic beliefs and ‘mental models of thinking’ (Ritchhart, 2002) to complement and augment teacher interviews and observations. For example, the use of Kelly’s (1955) repertory grid technique that is increasingly used in other studies of teachers’ cognition and beliefs (e.g. Calderhead, 1996; Middleton, 1995; Ritchhart, 2002) could have possibly given another layer to the data.

Moreover, while teachers’ and students’ perceptions and experiences with critical thinking were the focus of my study, I recognise that it is far from being comprehensive. My research did not comprise a large scale case study of a great number of teachers and students involving all types of government schools, but this was not my intention. The participants comprised six teachers and their students from three government schools that are typical of ‘neighbourhood schools’ in the Singaporean context. The key assumption I made here is that such schools are ‘typical sites’ (Patton, 2002) of Singaporean education across the primary, secondary and pre-university levels.

With this in mind, I am aware that findings from this study cannot be injudiciously applied nor extended to other contexts without due consideration of the nature of the participants and their contexts. The selected participants of the study of six teachers and a group of their students, like any persons
participating in a qualitative study, brought with them their idiosyncrasies and personal discourses. These undoubtedly shaped their 'multiple realities', perceptions and understandings of the research issues reflected in my subsequent findings.

Given the scope of my study as mentioned, interviews and lesson observations conducted cannot be described as exhaustive given the practical constraints and the number of participants that could be involved at the research sites. And as with any qualitative studies, the researcher is but a 'human instrument' (Lincoln & Denzin, 2003). This study is also limited by the inevitable subjectivity I brought into the research process — from the research impetus, to the data gathering, analysis and interpretation. As discussed in Chapter 3, the researcher's position that I assumed was that of Singaporean who had been both a student and teacher in the Singaporean educational system. Thus, while these prior experiences were valuable in providing insights, especially in the understanding of the nuances and subtleties that exist in the Singaporean educational context and that of participants' meanings in the study, I acknowledge that these very experiences are also a limitation which I attempted to mitigate as a researcher in the qualitative research process.

**Future research**

Given the inherent limitations and scope of the study, avenues for further research present themselves on a number of levels. However, I discuss those that could bear greatest significance in terms of continuing the dialogue in which the study engaged.

In the Singaporean context, a similar study could be conducted involving SAP (Special Assistance Plan), 'independent' and 'autonomous' schools, seen as high-achieving. Findings from such a study could present opportunities for comparison with the experiences of teachers and students from neighbourhood schools in the present study. They may also raise issues pertaining to students' socio economic status and cultural capital and how these may affect the dynamics of teaching thinking for teachers and learning.
it for students. More generally, such a study would also provide nuanced insights into the implementation of the policy. On this note, a study that incorporates perspectives of other key stakeholders in the educational system would also shed more insight into the extent of the shared or diverse understandings and experiences of the critical thinking policy thrust.

In terms of methodology, a mixed method approach and a longitudinal study of the issues involving a larger pool of participants over an extended period of time may also conjure deeper or even alternative understandings. A quantitative perspective of students' critical thinking abilities in the shape of assessments of critical thinking would also provide a different layer of understanding.

Further research can also be done into the nature of CTPCK. Investigating teachers with varying CTK might offer further insight into how CTK affects their CTPCK. In this regard, other forms of data gathering could also be incorporated to yield a more holistic understanding of teachers' CTPCK. Similarly, a study of Singaporean teachers who view themselves as experts in critical thinking instruction would also provide an instructive insight into how CTPCK is developed in the Singaporean context, offering further insights into how the different knowledge domains interact in practice and develop under local conditions. Finally, research on the links between CTPCK and student learning and outcomes could also provide deeper insights into the articulation between teacher knowledge and teacher practice, and student outcomes.

Closing reflections

This study began with concerns both as a teacher and a Singaporean. The research journey taken in a foreign context gave me the opportunity to relook, re-examine and rethink not only the Singaporean educational system, but what it means to be a Singaporean researcher studying Singaporean education from 'without'.

Having been a teacher in Singapore, this study has been very much the process of hearing the voices of teachers as it is of hearing my own voice. At times, I must admit that in their words, I do hear my own. And in my iterative
critical reflections, I am struck by a constant refrain — the critique of the state of teachers' knowledge, beliefs and practices in a thinking curriculum is, at times, akin to a reflexive study of the teacher self that resides within me. Certainly, in the qualitative inquiry that this study is, the researcher is but part of the 'research ecology' (Patton, 2002). To claim indifference between the researcher and the researched is to admit that educational research is an enterprise devoid of human complexities, that teachers, students and other stakeholders are mere automatons bereft of sensibilities and subjectivities.

Undoubtedly, the research consistently called for a critical reflection (more so when the study is concerned about critical thinking) — a critique, certainly, but not a criticism of the educational system that I have been inevitably part of as a former student and teacher. But the aim has always been led by the spirit of praxis and by the hope of conducting research that can contribute to theory and affect practice (Merriam, 1998, 2009), leading to change — some change. After all, in social research, 'we don't prove things right or wrong; the real test has always been how useful or interesting that way of looking at things is to an audience' (Becker, quoted in Denzin 1989).

On that note, I am hopeful that this study is in some ways useful and insightful; that it gives cause to pause and rethink the journey Singaporean education has been taking under TSLN. That is, it provides an opportunity to rethink the centrality of the often overlooked humanistic and emancipatory aspect of education — the development of students' thinking — in a system driven by pragmatism. And that it would impel the powers that be in Singaporean education to reconceptualise teaching as more than just a technical enterprise, but as a complex intellectual and emotional one enmeshed in and shaped by contexts larger than itself. The task of reconceptualisation might then lead to the critical re-examination of the rationalities, assumptions and tenets that have driven Singaporean education. Eventually, it is hoped that through all this, there comes a will to recognize and confront the inherent tensions in Singaporean education by genuinely listening and sponsoring the diverse voices of those who ultimately drive the education enterprise — teachers.
And in Singapore Teachers' Vision, *Singapore Teachers — Lead. Care. Inspire*, launched by MOE’s Director General of Education (Ho, 2009) incidentally at around the completion of this study, it might appear that there is finally some official and public recognition of teachers and the nature of their work. This nascent vision articulates the three core roles of teachers — leading, caring and inspiring pupils — and accords importance to teachers being part of a ‘community of practitioners’ (Ho, 2009) and the sense of teacher fraternity that is engendered through professional and social activities. However, whether the vision will eventually herald a new era for teachers or be drowned out by the pervading trenchant pragmatism and underpinning technocratic and instrumental rationalities that afflict the implementation of TSLN’s critical thinking thrust remains to be seen.
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346


APPENDICES

APPENDIX 1

TEACHER PLAIN LANGUAGE STATEMENT

Project Title: Rethinking *Thinking Schools, Learning Nation*: A case study of teachers’ knowledge and students’ perceptions of critical thinking in the Singaporean curriculum

Principal Researcher: Dr Sally Godinho

Co-Researchers: Dr Julianne Moss & Mr Akshir Ab Kadir

Dear .........................

You are invited to participate in the above research, which is being conducted by Dr Sally Godinho, Dr Julianne Moss and Mr. Akshir Ab Kadir from the Faculty of Education at the University of Melbourne as part of Mr. Akshir’s PhD dissertation. The project has ethics approval from the University of Melbourne and the approval to collect data from schools from the Ministry of Education.

The broad aim of the project is to understand the link among teachers’ knowledge of critical thinking, teachers’ pedagogical actions and students’ perceptions of critical thinking and learning in the context of the *Thinking Schools, Learning Nation* vision in the Singaporean educational curriculum, which Mr. Akshir, being a former teacher with the Ministry of Education of Singapore, is very familiar with.

The more specific aims are to gain insights into:

- how teachers perceive, construct and enact their knowledge base in critical thinking
- how students’ perceptions and attitudes about critical thinking and learning are influenced by the ways in which teacher knowledge in critical thinking is enacted in the classroom

In light of Singapore’s focus on the thinking curricula, there is an urgent need to better understand the relationship of teacher knowledge and critical thinking and how the dynamics that drive this relationship impact on student perceptions of learning and, ultimately, students’ learning outcomes. What is required of the participants in this study is detailed below for your consideration.
**Participation as a teacher**

Three to five of your lessons will be observed. The purpose of these is to seek an understanding of the enactment of critical thinking in the classroom in daily lessons. Following the observations, there will be two semi-structured interviews (20–30 mins) to explore your views on critical thinking. For the student group interview, you will be requested to select a group of six to eight of your students that you think best represent your typical class. The selection of students for the focus group should take into account the gender balance and range of abilities that reflect your typical class as well as the group dynamics that will make for a constructive focus group session. The times for lesson observations and interviews will be negotiated with you to fit in with your schedule.

**Participation as a student**

Your students will be observed as part of lesson observations and some of them will also be selected and invited by you to participate in a focus group. It is anticipated that about three to five lessons will be observed where the observer will seek an understanding of the enactment of critical thinking in the classroom in regular timed-taught lessons. There will be nothing additional required of your students, with the exception of six to eight of them who will be selected and invited to participate in focus group interviews (30-40 minutes). The interviews will be audio-taped for subsequent transcription. We believe it is essential to include your student's perspective of critical thinking and learning in the curriculum in this study. The times for lesson observations will be negotiated with you and focus group interviews times with you and your students.

**Important Considerations**

Please note that the lesson observations will be as unobtrusive as possible and any potential disruption will be minimised. With your permission, interviews will be audio-taped to ensure an accurate record of your comments during interviews is produced. When the tape has been transcribed, you will be provided with a copy of the transcript, so that you can verify that the information is correct and/or request deletions.

**Ethical Considerations**

We intend to protect your anonymity and the confidentiality of your responses to the fullest possible extent, within the limits of the law. Your name and contact details along with any data that you supply will be kept in a separate, password-protected computer file. In the final report, you will be referred to by a pseudonym. We will remove any references to personal information that might allow someone to guess your identity. However, you should note that as the number of people involved in the study is not large, it is possible that someone may still be able to identify you.

Once the research has been completed, a brief summary of the findings will be available to you. It is likely that the results will be presented at academic conferences and seminars, and published in educational journals. The data will be kept securely at the University of Melbourne for five years from the date of publication, before being destroyed.
Please be advised that your participation in this study is entirely voluntary. Should you wish to withdraw at any stage, or to withdraw any unprocessed data you have supplied, you are free to do so without prejudice. If you would like to participate, please indicate that you have read and understood this information by signing the accompanying consent form and returning it in the envelope provided.

**For more information**

For more information about this project participants should feel free to contact:

- Dr Sally Godinho (Principal Researcher): Lecturer – Education Faculty, The University of Melbourne: 613 8344 3692 email: s.godinho@unimelb.edu.au
- Dr Julianne Moss (Co Researcher): Senior Lecturer - Education Faculty, The University of Melbourne: 613 83443692 email j.moss@unimelb.edu.au
- Mr Akshir Ab Kadir (Co-Researcher), PhD Student – Education Faculty, The University of Melbourne: 613 97994642 email: m.abkadir@pgrad.unimelb.edu.au

Should you have any concerns about the conduct of the project, you are welcome to contact the Executive Officer, Human Research Ethics, The University of Melbourne, on ph: 613 8344 2073, or fax: 613 9347 6739.

Thank you very much for reading this information. We are deeply grateful for your crucial support and assistance in this important study.
CONSENT FORM FOR TEACHERS

Project Title: Rethinking Thinking Schools, Learning Nation: A case study of teachers' knowledge and students' perceptions of critical thinking in the Singaporean curriculum

Principal Researcher: Dr Sally Godinho

Co-Researchers: Dr Julianne Moss & Mr Akshir Ab Kadir

1. I consent to participate in the project named above. This will involve the observations of three to five of my lessons and participation in one to two semi-structured interviews, the details of which have been explained to me in the Plain Language Statement. A written copy of this information has been given to me to keep.

2. I authorise the researcher to observe my lessons and to interview me in one to two semi-structured interview sessions and to audio-tape responses to questions the researcher may ask me in relation to the project above during these interviews.

3. I acknowledge that:

   a. the possible effects of my participation, the observation of my lessons and the semi-structured interviews, have been explained to my satisfaction.

   b. I have been informed that participation or non-participation in the research project is entirely voluntary and a decision not to participate would not prejudice in any way my standing with the school either now or in the future.

   c. I have been informed that I am free to withdraw from the project at any time without explanation or prejudice and to withdraw any unprocessed data previously supplied.

   d. Any references to personal information that might allow someone to guess a participant's identity will be removed. However, as the number of people involved in the study is not large, it is possible that someone may still be able to identify participants.
e. I have been informed that the Ministry of Education has approved this research to be conducted.

f. I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements.

g. I consent to the semi-structured interviews and lesson observations and I acknowledge that transcripts will be returned to me for verification.

h. I also understand that no participants will be identified by name in any publications arising from the research.

Participant's Consent:

Teacher's Name: ....................................................................................

Signature:...........................................Date: ............................................

For more information about this project please feel free to contact:

- Dr Sally Godinho (Principal Researcher): Lecturer – Education Faculty, The University of Melbourne: phone 613 8344 3692 email: s.godinho@unimelb.edu.au
- Dr Julianne Moss (Co Researcher): Senior Lecturer – Education Faculty, The University of Melbourne: phone 613 83443692 email j.moss@unimelb.edu.au
- Mr Akshir Ab Kadir (Co-Researcher), PhD Student – Education Faculty, The University of Melbourne: 613 97994642 email: m.abkadir@pgrad.unimelb.edu.au

Should you have any concerns about the conduct of the project, you are welcome to contact the Executive Officer, Human Research Ethics, The University of Melbourne, on ph: 613 8344 2073, or fax: 613 9347 6739.

Thank you very much for reading this information. We are deeply grateful for your crucial support and assistance in this important study.
APPENDIX 2

STUDENT PLAIN LANGUAGE STATEMENT

Project Title: Rethinking *Thinking Schools, Learning Nation*: A case study of teachers’ knowledge and students’ perceptions of critical thinking in the Singaporean curriculum

Principal Researcher: Dr Sally Godinho

Co-Researchers: Dr Julianne Moss & Mr Akshir Ab Kadir

Dear Student,

You are invited to participate in the above research, which is being conducted by Dr Sally Godinho, Dr Julianne Moss and Mr. Akshir Ab Kadir from the Faculty of Education at the University of Melbourne as part of Mr. Akshir’s PhD dissertation. The project has ethics approval from the University of Melbourne and the approval to collect data from schools from the Ministry of Education.

The broad aim of the project is to understand the link among teachers’ knowledge of critical thinking, teachers’ classroom actions and students’ views of critical thinking and learning in the context of the *Thinking Schools, Learning Nation* vision in the Singaporean educational curriculum, which Mr. Akshir, being a former teacher with the Ministry of Education of Singapore, is very familiar with.

The more specific aims are to gain understanding into:

- how teachers view, construct and enact their knowledge base in critical thinking
- how students’ views and attitudes about critical thinking and learning are influenced by the ways in which teacher knowledge in critical thinking is enacted in the classroom

Because of Singapore’s education focus on critical thinking, there is an urgent need to better understand the relationship of teacher knowledge and critical thinking and how this relationship influences your views of learning and, ultimately, your
learning outcomes. What is required of you and teacher participants in this study is explained below for your consideration.

**Participation as a student**

You will be observed as part of lesson observations and some of you will also be selected and invited by your teacher to participate in a group interview together with some of your classmates. There will probably be about three to five lessons that will be observed where the observer will seek an understanding of the enactment critical thinking in the classroom in your daily lessons. There will be nothing additional required of you, with the exception of six to eight of you who will be selected and invited to participate in group interviews (about 30 minutes long) by your teacher. The interviews will be audio taped so that your all responses can be written down for further study. We believe it is important to include your view of critical thinking and learning in this study. The time for lesson observations and interviews, which will be held on your school premises, will be arranged with you and your teacher.

**Participation as a teacher**

Like you, your teacher, will be observed as part of the three to five lesson observations planned. The reason for this is to get an understanding of the enactment critical thinking in the classroom in daily lessons. Following the observations, there will two semi-structured interviews (20–30 mins) to explore your teachers’ views on critical thinking. For the student group interview, your teacher will be requested to select a group of six to eight of you from your class that your teacher thinks best represents the class. The times for lesson observations and group interviews will be arranged with your teacher and you respectively.

**Important Considerations**

Please note that the lesson observations will be as unobtrusive as possible and any potential disruption will be minimised. With your permission, interviews will be audio-taped so that we can ensure we have produced an accurate record of your comments during interviews. When the tape has been transcribed, you will be provided with a copy of the transcript, so that you can check that the information is correct and/or request deletions.

**Ethical Considerations**

We intend to protect your identity from being known and the confidentiality of your responses to the fullest possible extent, within the limits of the law. Your name and contact details along with any data that you supply will be kept in a separate, password-protected computer file. In the final report, you will not be referred to by your actual name. We will remove any references to any information about you that might allow someone to guess your identity. However, you should note that as the number of people involved in the study is not large, it is possible that someone may still be able to identify you.

Once the research has been completed, a brief summary of the findings will be available to you. It is also likely that the results will be presented at academic conferences and seminars, and published in educational journals. The data will be kept securely at the University of Melbourne for five years from the date of publication, before being destroyed.
Please be advised that your participation in this study is completely voluntary. Should you wish to withdraw at any stage, or to withdraw any unprocessed data you have supplied, you are free to do so. If you would like to participate, please sign the accompanying consent form to show that you have read and understood this information. Please return the consent form in to your teacher.

For more information

For more information about, please feel free to talk to your teacher ________________ or contact:

- Dr Sally Godinho (Principal Researcher): Lecturer – Education Faculty, The University of Melbourne: 613 8344 3692 email: s.godinho@unimelb.edu.au
- Dr Julianne Moss (Co Researcher): Senior Lecturer Education Faculty, The University of Melbourne: 613 83443692 email j.moss@unimelb.edu.au
- Mr Akshir Ab Kadir (Co-Researcher), PhD Student – Education Faculty, The University of Melbourne: 613 97994642 email: m.abkadir@pgrad.unimelb.edu.au

Should you have any questions about the way the project is being carried out, you are welcome to contact the Executive Officer, Human Research Ethics, The University of Melbourne, on ph: 613 8344 2073, or fax: 613 9347 6739.

Thank you very much for reading this information. We are deeply grateful for your important support and assistance in this important study.
CONSENT FORM FOR PARENTS/GUARDIANS AND STUDENTS

THE UNIVERSITY OF MELBOURNE

Project Title: Rethinking *Thinking Schools, Learning Nation: A case study of teachers' knowledge and students' perceptions of critical thinking in the Singaporean curriculum*

Principal Researcher: Dr Sally Godinho

Co-Researchers: Dr Julianne Moss & Mr Akshir Ab Kadir

I consent to participate in the project named above. This will involve the participation of three to five class lessons that will be observed and possible participation in a focus group, the details of which have been explained to me in the Plain Language Statement. A written copy of this information has been given to me to keep.

I authorise the researcher to observe and take notes of my participation in these lessons and to audio-tape responses to questions the researcher may ask in relation to the project in the focus groups.

I acknowledge that:

a. the possible effects of my participation, the observation of the lessons and focus group interview, have been explained to my satisfaction.

b. I have been informed that participation or non-participation in the research project is entirely voluntary and a decision not to participate would not prejudice in any way my standing with the school either now or in the future. If I choose not to participate, it will not affect my school work or grades in any way.

c. I have been informed that I am free to withdraw from the project at any time without explanation or prejudice and to withdraw any unprocessed data previously supplied.

d. Any references to personal information that might allow someone to guess a participant's identity will be removed. However, as the number of people involved in the study is not large, it is possible that someone may still be able to identify participants.

e. I have been informed that the Ministry of Education has approved this research to be conducted.
f. I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements.

g. I consent to the focus group interviews being audio-taped and I acknowledge that transcripts will be returned to me for verification.

h. I also understand that no participants will be identified by name in any publications arising from the research.

Student's Consent:

Student's Name: ..............................................................................................................

Signature:.............................................Date: .........................................................

Parent's/Guardian's Consent:

Parent's/Guardian's Name: ............................................................................................

Signature:.............................................Date: .........................................................

For more information about this project please feel free to contact your child's teacher, or:

- Dr Sally Godinho (Principal Researcher): Lecturer – Education Faculty, The University of Melbourne: phone 613 8344 3692 email: s.godinho@unimelb.edu.au
- Dr Julianne Moss (Co Researcher) Education Faculty, The University of Melbourne: phone 613 83443692 email j.moss@unimelb.edu.au
- Mr Akshir Ab Kadir (Co:Researcher), PhD Student – Education Faculty, The University of Melbourne: 613 97994642 email: m.abkadir@pgrad.unimelb.edu.au

Should you have any concerns about the conduct of the project, you are welcome to contact the Executive Officer, Human Research Ethics, The University of Melbourne, on ph: 613 8344 2073, or fax: 613 9347 6739.

Thank you very much for reading this information. We are deeply grateful for your crucial support and assistance in this important study.
APPENDIX 3

Interview Schedule

Teacher Interview

- What does teaching mean to you? What would you say have been your goals and ideals as a teacher?

- Based on your experience, tell me about what you think has been the most effective way(s) of teaching.

- Now from the other spectrum, based on your experience, how have the majority of the students you taught learnt best?

- Now, take me through what you and your class do in a typical lesson – what kinds of activities/routines do you normally do?

- Share with me your understanding of the term ‘thinking’ in the vision ‘Thinking Schools’? How would you personally conceptualise critical thinking?

- What do you understand by the phrase ‘critical thinking’?

- Are your understandings largely a result of intuitive thinking or a product of theories that you explicitly subscribe?

- Have you attended any professional development, conferences, etc on critical thinking in the last five years?

- How important is critical thinking to your instructional objectives?

- Would you say your department or school has a shared approach to teaching critical thinking or left to the individual teacher?

- How important is it for students to acquire sound intellectual criteria?

- How important is it for student to learn how to assess their own work?

- Do students generally come to your class with well developed intellectual standards?

- What particular thinking skills do you believe are most important for your students to develop?

- So, what do you think of your knowledge of critical thinking?
• How would you say you have acquired this knowledge? Tell me what role did a. your personal beliefs/interests/experience, b. teacher training, c. PD and d. school and ministerial policy play in this?

• From the perspective of teacher training, PD, school and ministerial policy, what do you think can be done to help you acquire/further enhance your critical thinking knowledge? Are there other things you think that can be done?

• What role does critical thinking play in your lesson planning/lessons generally? Could you give me some examples of how you incorporated critical thinking in your lessons?

• So, what do you think has hindered/encouraged you from incorporating critical thinking in your lessons?

• What do you think can be done/ further in terms of of teacher training, PD, school and ministerial policy to support/encourage you in the incorporation of critical thinking in your teaching?

• How do you think your knowledge of critical thinking has influenced the extent and the way in which you bring critical thinking into your teaching? Share with me some examples.

Student Focus Group Interview:

1. What does learning mean to you?

2. What for you has been the best way(s) to learn? What sorts of activities or teaching do you think has provided you with the most effective way of learning?

3. What do you think of lessons in which you are encouraged to think through things you have learnt and where your teachers raises questions and design activities that encourage you to discuss and think (provide e.g.)? Tell me the reasons behind that/ Can you share with me examples?
4. What do you think about learning in which teachers provide you with much of what you have to learn and where you have to memorise things (provide e.g.)? Can you share with me examples?

5. What does the word ‘thinking’ or ‘critical thinking’ mean to you? Can you give me examples in the classroom or elsewhere when you thought you were doing this or when this was happening?

6. So, how important is it for you to be able to do this in your life beyond school?

7. After being in school for some years now, how would you then see yourself as a critical thinking learner/learner who is able to think well?

8. Now thinking back to the things you have been doing in class or the ways your teachers have been teaching you; how did all these things make you feel about the importance of thinking in your learning?

9. Finally, good thinkers can be described as people who have the ability to think well and are able to apply these abilities in learning and in much of their lives; someone like Lee Kuan Yew (a founding father of modern Singapore) is a good example. What sort of things you think can be done by your teachers, school and government to help you become learners who are also good thinkers or what do you think your teachers, school or the government can do to make you believe that thinking is an important part of learning?
APPENDIX 5

Desired Outcomes of Education

Introduction: The Singaporean - an Individual, a Citizen

*Education does two things: it develops the individual and educates the citizen.*

Education is about nurturing the whole child. Indeed, this is the traditional Asian understanding of the term. Education means developing the child morally, intellectually, physically, socially and aesthetically.

The foundation of a person is his values. From these spring his outlook on life and his goals in life. Together with the home, our schools have to work carefully and painstakingly to shape the morals of our children. Our children also have to learn to relate to other people - their elders and their peers, people who are like us and people who are different. Education also develops each child's unique talents and abilities to the full. Education teaches him to keep fit and healthy for life. And education teaches him to appreciate the finer things in life and the beauty of the world around him.

"An educated person is one responsible to himself, his family, and his friends."

But all of us also see beyond ourselves, our family and our friends, and look towards society and nation. It is society at large which gives us a sense of identity and purpose, security and confidence. In turn, we have obligations and responsibilities to the community. Therefore, our schools will teach our children to identify Singapore as our home; a home to live in, strive to improve, and defend.

"An educated person is also someone who is responsible to his community and country."

These two roles of education reinforce and complement each other. What we would all want to develop in each individual child overlaps with what we desire of every citizen.

What are the outcomes for?

Knowing exactly what we want allows us to assess how well our education system is doing. In the end, it is neither what we do nor how much we do that matters. What we have to assess is whether all that we do contributes to achieving the outcomes that we desire.

The Outcomes of Education

The following list shows what we want from and expect of our children when they graduate from our Institute of Technical Education, Polytechnics and Universities.

All Post-Secondary and Tertiary Students should:
be morally upright, be culturally rooted yet understanding and respecting
differences, be responsible to family, community and country
believe in our principles of multi-racialism and meritocracy, appreciate the
national constraints but see the opportunities
be constituents of a gracious society
be willing to strive, take pride in work, value working with others
be able to think, reason and deal confidently with the future, have courage
and conviction in facing adversity
be able to seek, process and apply knowledge
be innovative - have a spirit of continual improvement, a lifelong habit of
learning and an enterprising spirit in undertakings
Think global, but be rooted to Singapore

The following list also shows what we expect of our young who aim to be national, community, business or professional leaders.

Potential leaders should:

be committed to improving society
be proactive in surmounting our constraints
have compassion towards others
be able to inspire, motivate and draw out the best from others
be able to chart our destiny and lead
be able to forge breakthroughs in a knowledge-based economy
be creative and imaginative
have the tenacity to fight against the odds and not quit

Intermediate Outcomes of Education

The next table shows what we hope our children will be at each stage in our schools. Each level will build upon what has been done before. It will also lay the foundation for what will continue to be built at the next level. For example, primary schoolchildren start by learning to love Singapore. But at the same time, they will also begin the next stage of learning to know it. When they become secondary schoolchildren, they will learn both to love and know Singapore. And they will also start preparing for the next stage, which is to look into the principles by which Singapore is led and governed. There is therefore no sharp dividing line between each level.
<table>
<thead>
<tr>
<th>Primary</th>
<th>Secondary</th>
<th>Junior College</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the end of primary school, pupils should:</td>
<td>At the end of secondary school, students should:</td>
<td>At the end of junior college, students should:</td>
</tr>
<tr>
<td>be able to distinguish right from wrong</td>
<td>have moral integrity</td>
<td>be resilient and resolute</td>
</tr>
<tr>
<td>have learnt to share and put others first</td>
<td>have care and concern for others</td>
<td>have a sound sense of social responsibility</td>
</tr>
<tr>
<td>be able to build friendships with others</td>
<td>be able to work in teams and value every contribution</td>
<td>understand what it takes to inspire and motivate others</td>
</tr>
<tr>
<td>have a lively curiosity about things</td>
<td>be enterprising and innovative</td>
<td>have an entrepreneurial and creative spirit</td>
</tr>
<tr>
<td>be able to think for and express themselves</td>
<td>possess a broad-based foundation for further education</td>
<td>be able to think independently and creatively</td>
</tr>
<tr>
<td>take pride in their work</td>
<td>believe in their ability</td>
<td>strive for excellence</td>
</tr>
<tr>
<td>have cultivated healthy habits</td>
<td>have an appreciation for aesthetics</td>
<td>have a zest for life</td>
</tr>
<tr>
<td>love Singapore</td>
<td>know and believe in Singapore</td>
<td>understand what it takes to lead Singapore</td>
</tr>
</tbody>
</table>

Help us to give our children the education they deserve.

(available online at http://www.moe.gov.sg/education/desired-outcomes/)
Author/s: Ab Kadir, Mohammad Akshir

Title: Rethinking Thinking Schools, Learning Nation: teachers’ and students’ perspectives of critical thinking in Singaporean education

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