IMPLEMENTING INFORMATION TECHNOLOGY IN EDUCATION IN HONG KONG PRIMARY SCHOOLS: AN EVALUATIVE CASE STUDY IN POLICY ANALYSIS

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Abstract

This is an evaluative case study in policy formulation and implementation in Hong Kong. The main aim of the research was to investigate the impact of the Information Technology in Education (ITEd) Strategy (EMB, 1998a; EMB, 2004a) on practice in primary schools in Hong Kong and the factors which influenced the implementation of the strategy. The four-stage Policy Development Model developed by Bell and Stevenson (2006) was used as the conceptual framework for the research together with a pedagogical framework devised by Hirumi (2002). The study focussed on the use of Information Technology (IT) to support a paradigm shift in learning from a largely textbook based teacher centred approach to a more interactive and learner centred approach. The researcher used both a questionnaire survey and semi-structured interviews to seek the perception of Principals in Hong Kong primary schools. The research concluded that there was tension between the formulation of the ITEd Strategy and its implementation in schools. Despite the principals' support for the visions of the strategy, the potential of IT to transform learning was not fully realised. This was because of the failure of the Hong Kong Government to anticipate the extent of the challenge and to provide sufficient guidance and support to overcome barriers to change which arose during the implementation phase. These barriers involved value systems, psychological and practical factors and they affected both principals' and teachers' attitude to change. The findings imply further action that might be taken by the Hong Kong Government to provide appropriate support for the development of IT in Hong Kong primary schools.

Definition of Terms

ED	Education Department of the Hong Kong Government
EDB	Education Bureau of the Hong Kong Government
EMB	Education and Manpower Bureau of the Hong Kong Government
HKSAR	Hong Kong Special Administrative Region
ICT	Information and Communication Technology
IT	Information Technology
ITC	Information Technology Coordinator
ITEd	Information Technology in Education
LAN	Local Area Network
MMLC	Multimedia Learning Centre
QEF	Quality Education Fund
SAMS	School Administration and Management System
SMI	School Management Initiative
TDM	Total Design Method
TSS	Technical Support Specialist
UNESCO	United Nations Educational, Scientific and Cultural Organization

Table of Contents

Chapter 1 Introduction 1
1.1 Background 2
1.2 Research Aim and Questions 5
1.3 Significance of the Study 8
1.4 Layout and Organisation of the Thesis 11
Chapter 2 Literature Review 13
2.1 What is Policy? 14
2.2 Policy Development and the Policy Process 15
2.3 Identifying the Socio-political Environment 19
2.3.1 The New National Identity of Hong Kong 19
2.3.2 Economic Competitiveness and the Pressure of Globalisation 20
2.3.3 System Modernisation and the Need for Pedagogical Reform 21
2.4 Developing the Strategic Direction of the ITEd Strategy 21
2.4.1 Paradigm Shift 23
2.4.2 Resourcing – Four Key Components 26
2.4.3 Distributed Implementation 27
2.5 Developing the ITEd Strategy – from Formulation to Implementation 28
2.5.1 Accountabilities 29
2.5.2 Institutional Values and Commitments 30
2.5.3 Teachers' Changing Role 32
2.6 Policy Implementation – from Principles to Practices 33
2.6.1 Expected Use of Information Technology in Education 33
2.6.2 Resource Allocation 34
2.6.3 Teachers' Professional Development 35
2.6.4 Teacher Engagement 35
2.6.5 Curriculum Adaptation 37
2.6.6 Community Participation 37
2.7 Development of the Research Questions 38
Chapter 3 Research Methodology 40
3.1 Research Type – Evaluative Case Study Research 41
3.2 Research Paradigm – Dualism Approach 44
3.3 Phase One of the Research – Quantitative Method 47
3.3.1 Quantitative Survey by Questionnaire Adopted 47
3.3.2 Sample Selection – Population Targeted 49
3.3.3 Response Rate 50

3.3.4 Instrument Design 51
3.3.5 Data Analysis 54
3.4 Phase Two of the Research – Qualitative Method 55
3.4.1 Qualitative Semi-Structured Interview Adopted 56
3.4.2 Sample Selection – Stratified Randomly Selected 57
3.4.3 Semi-Structured Interview Schedule 58
3.4.4 Instruments 59
3.4.5 Data Analysis 59
3.5 Accessibility Considerations of the Research 60
3.6 Ethical Considerations of the Research 61
3.7 Reliability Considerations of the Research 63
3.8 Validity Considerations of the Research 64
3.9 The Implementation of the Research 67
3.9.1 Phase One of the Research - Survey 67
3.9.2 Phase Two of the Research - Semi-structured Interview 70
Chapter 4 Research Findings 72
4.1 Research Question One: To What Extent do Primary School Principals Believe the Visions of the IT Strategy Have Been Achieved? 72
4.1.1 The Achievement of a Paradigm Shift in Teaching and Learning . 72
4.1.2 The Achievement of the Visions of the ITEd Strategy 73
4.1.3 The Use of IT in Hong Kong Primary Schools 75
4.1.4 Changes in Teaching Approach 76
4.1.5 Effect of the ITEd Strategy on Students' Learning 77
4.2 Research Question Two: How Far have the Policy's Central Components Contributed to its Success? 80
4.2.1 Contribution of Central Component (a) – IT Facilities 80
4.2.2 Contribution of Central Component (b) – Teacher Enablement and Professional development 84
4.2.3 Contribution of Central Component (c) – Curriculum and Resource Support 85
4.2.4 Contribution of Central Component (d) – Community-wide Environment 86
4.3 Research Question Three: To What Extent is the Meeting of Objectives in Individual Schools Related to Specific School Characteristics? 87
4.4 Research Question Four: What other Factors have Helped or Hindered Teachers in Schools to implement the ITEd Strategy? 88
4.4.1 To What Extent Did the Principals Support the Key Visions of the ITEd Strategy? 88

4.4.2 Concerns About the Visions of the ITEd Strategy 89
4.4.3 Major Reasons for Teachers Implementing the ITEd Strategy 94
4.4.4 Major Reasons for Teachers Not Implementing ITEd Strategy 96
4.4.5 The Process of Implementation of the ITEd Strategy 99
4.4.6 What May Do Now to Ensure the Future Development of IT Education in the Primary Schools? 105
4.5 Summary of the Findings 109
Chapter 5 Discussion of the Research Findings 112
5.1 Findings for Research Question One: To What Extent Do Primary School Principals Believe That the Visions of the ITEd Strategy Have Been Achieved? 112
5.2 Findings for Research Question Two: How Far Have the Policy's Central Components Contributed to Its Success? 114
5.2.1 The Provision of IT Facilities 115
5.2.2 Teacher Engagement and Professional Development 116
5.2.3 Curriculum Adaptation to Support the Integration of IT into the Curriculum 117
5.2.4 Community Participation 118
5.3 Findings for Research Question Three: To What Extent Was the Meeting of Objectives in Individual Schools Related to Specific School Characteristics? 118
5.4 Findings for Research Question Four: What Other Factors have Helped or Hindered Teachers in School to Implement ITEd Strategy? 119
5.4.1 To What Extent did the Principals Believe in the Visions of the Strategy? 120
5.4.2 What were the Principals Perceptions of the process of Policy Implementation? 121
5.4.3 What did the Principals See as the Strengths and Weaknesses of the implementation of the Policy? 122
5.4.4 What did the Principals Think Could be Done to Improve the Policy? 122
5.5 Summary 124
Chapter 6 Conclusion 125
6.1 Summary of the Conceptual Framework 126
6.2 Summary of the Research Methodology 128
6.3 Summary of the Findings 128
6.3.1 Summary for Research Question One: To What Extent Do Primary School Principals Believe That the Visions of the ITEd

Strategy Have Been Achieved? 128
6.3.2 Summary for Research Question Two: How Far Have the Policy's Central Components Contributed to Its Success? 131
6.3.3 Summary for Research Question Three: To What Extent Was the Meeting of Objectives in Individual Schools Related to Specific School Characteristics? 131
6.3.4 Summary for Research Question Four: What Other Factors have Helped or Hindered Teachers in School to Implement ITEd Strategy? 131
6.4 The Implications of the Findings 133
6.5 Limitations of the Research 137
6.6 Suggestions for Further Research 138
6.7 Concluding Comments 139
References 141
Appendix 1 Teacher-centred and Learner-centred Approaches (Hirumi, 2002) ... 160
Appendix 2 Survey Questionnaire (for Pre-testing) 161
Appendix 3 Survey Questionnaire (for Pilot Survey) 167
Appendix 4 Survey Questionnaire (Finalized English Version) 172
Appendix 5 Survey Questionnaire (Finalized Chinese Version) 177
Appendix 6 Semi-Structured Interview Schedule (English Version) 182
Appendix 7 Semi-Structured Interview Schedule (Chinese Version) 183

List of Figures and Tables

	Descriptions	**Page#**
Figure 2.1	Policy framework suggested by Northern California Grantmakers	17
Figure 2.2	Policy framework suggested by Bell and Stevenson	18
Figure 2.3	Application of Bell and Stevenson's Model to Hong Kong ITEd Strategy	23
Table 3.1	Interpretations of correlation coefficient	55
Table 3.2	Number of Schools selected for interview	58
Table 3.3a	Questionnaires returned – by type of school	68
Table 3.3b	Questionnaires returned – by age of school	68
Table 3.3c	Questionnaires returned – by size of school (no. of teachers)	69
Table 3.3d	Questionnaires returned – by size of school (no. of students)	69
Table 3.3e	Questionnaires returned – by years of the school adopted IT in Education	70
Table 3.3f	Selected Sample for Semi-structured Interview	70
Table 4.1	Agreement of the respondents about paradigm shift	73
Table 4.2	Statistics of respondents agreed with the visions of the ITEd Strategy	74
Table 4.3	The major purposes for the school's use IT	75
Table 4.4	The changes in the teaching approach of those teachers after using IT	76
Table 4.5	The students' dominant view about the use of IT to support learning	77
Table 4.6	Learning outcomes after using IT in Education	78
Table 4.7	Statistics of respondents agreed with the contribution of the central components	80
Table 4.8	Statistics of the support level of the respondents with the visions for the ITEd Strategy	88
Table 4.9	The major reasons for the teachers implementing IT in education	95
Table 4.10	The major reasons for the teachers not implementing IT in education	96
Table 4.11	The statistics concerning the process of ITEd Strategy implementation	100
Table 6.1	The formulation and implementation of ITEd Strategy in Hong Kong	127

Chapter 1 Introduction

'Public policy is whatever governments choose to do or not to do' (Dye, 1998, p.2). Education policy, whatever a government chooses to do or not to do in education, is high on the agenda of governments across the world. Global pressures increasingly focus attention on the outcomes of education policy and on their implications for economic prosperity and social citizenship. In Hong Kong, a reform proposal for the education system was publicised in 2000 (Education Commission, 2000). According to the Education Commission, the public agreed to the principles and directions of the reform in general, but there were also worries that the scope of the reform was too broad and there would be too many drastic changes which would cause teachers, students, parents and other parties to experience difficulties in adapting to such changes.

Hong Kong, in common with all other countries, currently faces changes triggered by developments in information technology (IT) in all aspects of its society, from media, through communications to international business relations. There are many educators who believe that IT has the potential to enhance education in schools (Barab and Duffy, 2000; Reksten, 2000; Resnick, 2002; Kollar and Fischer, 2006). It is in the education arena that Hong Kong is attempting to implement radical and far-reaching transformations, both in terms of preparing students for a future 'information society' mediated by digital technologies and in terms of transforming teaching and learning with information technologies (EMB, 1998b).

However, policies frequently have side effects or unintended consequences. This is because the environments that policies seek to influence or manipulate are typically complex adaptive systems (e.g. governments, societies, large organizations) and the unforeseen factors may result in a policy change having counter-intuitive results such as policy being partially implemented, producing unintended consequences or even being implemented in the opposite direction to the original intentions. In the field of education, there is often an underdeveloped understanding of how education policy is formed, how it is implemented and how it impacts on schools and colleges (Bell and Stevenson, 2006). In the case of information technology in education, implementation is affected by a range of factors, which involve the teachers/teaching, leadership and management and the provision of an appropriate infrastructure. The Information Technology in Education (ITEd) Strategy (EMB, 1998a; EMB, 2004a) in Hong Kong Primary Schools was selected as a case-study in policy formulation and implementation in this research study.

1.1 Background

Ever since the sovereignty of Hong Kong changed on 1st July 1997, a number of new education policies have been implemented. Since then, schools in Hong Kong have been introduced to a significant number of substantial educational reforms, involving curriculum, pedagogy, assessment and more recently a reform of the structure of secondary and higher education. In addition, teachers are subject to greater demands for accountability, school self-evaluation, and external school review (Education Department, 1997). Meanwhile, since 1998, all except 114 secondary schools in Hong Kong have been required to use Chinese rather than English as the medium of instruction.

A central thrust of government policy was the promotion of the use of information technology in education to enhance teaching and learning. In his 1998 Policy Address, the Chief Executive of the Hong Kong Special Administrative Region (HKSAR) Government outlined the ultimate aim for such educational change with an emphasis on developing learners' capabilities which was dependent on more innovative teaching methods and improved management:

> *Our policy objective is to ensure that young people in Hong Kong receive an all round quality education to prepare them for life and work and to provide them with an aptitude towards lifelong learning. (HKSAR, 1998, p.113)*

> *Our education system has served us well but as we move into a new era, we must be responsive to changing needs. This requires us to be innovative about our teaching methods and management. (HKSAR, 1998, p.114)*

In response to the aims of the HKSAR, the Education and Manpower Bureau (EMB) published a Five-Year Strategy for the use of IT in education, and central to this was the following aspiration:

> *…. to link up our students with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global outlook. This is particularly essential if HK is to maintain its international competitiveness into the next century. IT can provide our students with a vast world of learning resources and perspectives …. Such exposure will also provide the stimulus for the development of a creative mind.... (EMB, 1998a, Section 1.4)*

Until this time, the pace of introducing IT in school education had been very slow. Computers were first introduced as a pilot scheme for Computer Studies at Secondary 4 and 5 levels in some selected secondary schools in 1984. Subsequently, until 1997, computers were present in the school curriculum only as computer-related subjects at secondary school levels; there was no official computer-related subject in primary schools at all before year 1997. There was a weak IT culture in schools and most teachers had little experience of using IT in teaching (Education Commission, 2000). Thus the five-year strategy was committed to providing a wealth of hardware and IT training to teachers to bring about a major shift in teaching and learning. Its vision was to:

> *'bring about a paradigm shift in the delivery of school education - from a largely textbook-based teacher-centred approach to a more interactive and learner-centred approach' (EMB, 1998a, Section 8.1)*

However, it is doubtful whether the achievement of such a paradigm shift can be achieved by the provision of technical know-how and hardware alone. The change process involves far more than the provision of an IT infrastructure; there are key considerations for classroom teachers and the leadership/management of institutions.

In the case of the classroom teachers, key considerations include: teachers' beliefs about the use of IT (Healey, 2005; Schmidt and Callahan, 1992; Drier, 2001); teachers' readiness for change from a teacher centred to a more centred learner approach (Rogers, 1995; Eacute and Esteve, 2003); teachers' empowerment for pedagogical change (Fabry and Higgs, 1997; Sandholtz et al., 1997; Evans-Andris, 1995); and the amount and quality of support on how to integrate technology into their subjects. The lack of professional development is a significant barrier to the integration of technology into teaching (Heck and Wallace, 1999; Mumtaz, 2000; Creighton, 2003).

In the case of the school leaders/managers and especially the principals, they provide an important link between external policy directives and classroom teachers. Principals with positive attitudes towards the use of IT are more likely to transmit these attitudes to their teachers (Granger et al., 2002). The way in which school management works with the teachers affects the level of co-operation they receive (Gipson, 2003).

In Hong Kong, the prospects for the successful implementation of IT did not appear to be propitious, with the lack of professional development opportunities a key factor. In a review carried out by the education section of a Hong Kong newspaper published on 16 Feb 2000 (Singtao, 2000), it was argued that the IT policy had had a negative impact on serving teachers, especially those who had been in the profession for a number of years. In this review, many teachers reported they had not learned any computer skills and the policy had resulted in a feeling of fear and a sense of insecurity. Their fear was understandable because many teachers did not possess relevant skills to apply information technology in their teaching. In the same review, some school heads and teachers were also sceptical about the way in which the policy was being formulated and implemented. They had a strong feeling that this was another top-down initiative imposed by the Government which had been introduced without an overall comprehensive plan to support it.

Today, the ITEd Strategy set out by the government in 1998 is over, although the impact of it is still continuing. In 2004, in the updated strategy document (EMB, 2004a, p.10), the HKSAR Government claimed that the Five-year Strategy had successfully laid the necessary infrastructure, provided teachers with the basic training in the use of IT, and had collected a rich repository of digital education resources. Regional centres of IT excellence had emerged, innovative pedagogies and practices had surfaced, and students' generic IT skills had improved (EMB, 2004b, p.1).

Although the Government announced that the policy had been successful, they still thought that building upon the current strengths and having regard to the barriers identified, the focus on the following goals should continue in the future (EMB, 2004a, p.10; EMB, 2004b, p.8):

(1) *using IT as a lever to support and advance the Education Reform initiatives;*
(2) *fostering the development of leadership capacities in schools to develop holistic and strategic school plans for making effective uses of IT to realize the school's vision and goals;*
(3) *further integration of IT into the curriculum as well as the learning and teaching processes;*
(4) *defining Information Literacy levels to set targets for students to develop IT skills and use them for learning and communication; and*
(5) *building partnership between various stakeholders to undertake initiatives, and pooling efforts, funding and expertise from various parties to sustain the momentum.*

The ITEd Strategy was implemented in both primary and secondary schools (EMB, 1998a). Due to the obvious difference in the nature of primary and secondary education, the impact of the policy in these two groups should be studied separately. In this study, in order to ensure appropriate focus and depth, only primary education has been selected. The study seeks to ascertain to what extent the paradigm shift from a teacher-centred to learner-centred approach has been achieved by the IT policy reform and in particular the factors that have helped and hindered the implementation of the policy. It is expected via such study, that the future direction of Information Technology in primary education in Hong Kong can be identified.

1.2 Research Aim and Questions

The research project has focused on an evaluation of the process of implementation of the education policy of using Information Technology in primary education and its impact on classroom practice. The main research questions are:

To what extent have Hong Kong primary schools successfully implemented the ITEd Strategy to achieve a paradigm shift from '*a largely textbook-based teacher-centred approach to a more interactive and learner-centred approach*' (EMB, 1998a, Section 8.1). What factors have helped or hindered the implementation of the policy?

The term paradigm shift was first used by Thomas Kuhn in his 1962 book *The Structure of Scientific Revolutions* to describe a change in basic assumptions within the ruling theory of science (Kuhn, 1962). It has since become widely applied to many other realms of human experience as well. According to Kuhn, 'a paradigm is what members of a scientific community share' (Kuhn, 1977). A paradigm in education refers to the widely accepted values and beliefs about effective pedagogy and the learning process (Hon, 2004). Gipps (1996, p.2) defines pedagogy as the '*interactions between the teacher, students, the learning environment and tasks*'. This definition incorporates the taught curriculum, the hidden curriculum, teaching method and assessment process used by the teachers as well as their planning.

A paradigm shift is when a significant change happens - usually from one fundamental view to a different view of pedagogy and/or learning (Bailey, 2005). According to Murphy (1996), the meaning and status of pedagogy has shifted in different cultures and at different points of time in history. Some academic commentators (Shepard, 2000; Gipps, 1999) have detected an emerging paradigm shift based on cognitive and social-constructivist theories of learning which is

replacing a transmission theory of learning. For Townsend et al. (1999), a paradigm shift can be seen as the shift from a 'Second Millennium' perspective to 'Third Millennium' perspective (Townsend et al., 1999). This entails a shift in a range of dimensions which include: a teacher-centred approach to learning to a learner-centred approach to learning; from a content-focus to a process/skills-focus; from individual learning to collaborative/ interactive learning; and from examination-oriented learning to lifelong and life-wide learning. In Hong Kong, the paradigm shift which is envisaged in the ITED Strategy involves all these dimensions (EMB, 1998a).

In a teacher-centred approach, the teacher is the one in control of the information that is received by the students and is responsible for how much information is being disseminated to them and the way in which that is done. The approach involves direct teaching which includes giving explanations, asking questions, giving presentations and demonstrations. In a learner-centred approach, the learners construct their own knowledge and bring their authentic experiences into the learning process with the teacher as the facilitator.

In order to evaluate the success of the intended '*paradigm shift of pedagogy from a textbook-based teacher-centred approach to a more interactive and learner-centred approach*' introduced by the information technology policy in Hong Kong and the factors which affected the implementation, it is important to focus on the individual educational institution because this is the point that represents the interface between the wider policy environment, the teachers and the individual learners. Those principals working in institutions are both make sense of policy from outside, and generate and implement policy within institutions working with classroom teachers. So, the research questions focus on the perceptions of principals towards the ITEd Strategy and the specific factors in individual schools. Based on these, the following specific research questions were developed.

Specific Research Questions

(1) To what extent do Primary School Principals believe the visions (EMB, 1998a, Section 1.4) of the ITEd Strategy have been achieved?
    - *To turn our schools into dynamic and innovative learning institutions where students can become more motivated, inquisitive and creative learners.*
    - *To link up our students with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global outlook.*

- *To develop in our students capabilities to process information effectively and efficiently.*
- *To develop in our students the attitude and capability for independent life-long learning.*

(2) How far have the policy's central components contributed to its success?

- To provide adequate IT facilities, including network facilities, for our students and teachers to enable them to access information (EMB, 1998a, Chapter 3)
- To encourage key players in the school system to take up the challenges of their respective new roles (EMB, 1998a, Chapter 4)
- To integrate IT into school education meaningfully through necessary curriculum and resource support (EMB, 1998a, Chapter 5)
- To foster the emergence of a community-wide environment conducive to the culture change (EMB, 1998a, Chapter 6)

(3) To what extent is the meeting of objectives in individual schools related to specific school characteristics?

- What are the differences according to the type, size and age of the schools?
- What are the differences according to the schools' previous IT experience?

(4) What other factors have helped or hindered teachers in schools to implement the ITEd Strategy?

- To what extent do Primary School Principals support the key objectives of the ITEd Strategy?
- What are the perspectives of Primary School Principals on the process of ITEd Strategy implementation? Are they well-informed on the operational details of the policy? Do they perceive they have sufficient support to implement the policy?
- What do Primary School Principals see as the strengths and weaknesses of the ITEd Strategy?
- What do Primary School Principals believe they may do now to ensure the future development of IT education in the primary schools?

Hypothesis of the Research

Although the Government claimed that the policy was successful (EMB, 2004a), the author doubts that the implementation of the policy has reached the target of achieving a paradigm shift in teaching and learning, despite the huge investment. So, the research hypothesis (H_1) for this study is 'the ITEd Strategy has not been implemented successfully in primary education to achieve its desired outcomes of a paradigm shift from a largely textbook-based teacher-oriented approach to a more

interactive and learner-centred approach'. The null hypothesis (H_0) is then 'the ITEd Strategy has been implemented successfully in primary education to achieve its desired outcomes of a paradigm shift from a largely textbook-based teacher-oriented approach to a more interactive and learner-centred approach'. If the null hypothesis is rejected, it can be inferred that the ITEd Strategy has not been implemented successfully in primary education to achieve the paradigm shift.

1.3 Significance of the Study

The United Nations Educational, Scientific and Cultural Organization (UNESCO) conducted an 'Information and Communication Technology in Education Policy' project to promote appropriate policy models and strategies to assist the integration of information and communication technology into education in the Asia-Pacific region. This project included a special emphasis on developing policies which utilize IT to remove barriers to participation in education and enhance the quality of education.

The situations and needs of the various Asia-Pacific countries differ widely. With respect to these, UNESCO has identified four levels of IT integration into the education system (UNESCO, 2006).

- Level 1 is for countries with no specific IT in education policy or plan.
- Level 2 is for countries that are either in the stage of developing their policies, or have just developed their policies but are not implementing them as yet.
- Level 3 is for countries that have been applying policies for three years or more.
- Level 4 is for countries which are already integrating IT into education in an advanced way.

These four general categories of country groups are not strict or comprehensive, but are overlapping and subject to rapid change. Altogether, UNESCO has collected data and carried out research on over 40 countries in the Asia and Pacific Region. If the UNESCO classification is applied to Hong Kong, the region would be at Level 3 of its framework. However, since Hong Kong is not a country, the region is not included in the scope of the UNESCO study. Instead, several local studies on the ITEd Strategy have been carried out by local tertiary institutions with funding from the HKSAR.

The University of Hong Kong undertook two major studies of IT integration. The first was the Second International Information Technology in Education Study (SITES-M1): Hong Kong SAR Report (Law et al., 1999), which was conducted from 1997 to 1999. The study aimed to collect information on the application of IT in local

school education for international comparison through questionnaire surveys of school principals, technology co-ordinators, teachers and students in primary and secondary schools. Data was collected on IT-related curriculum goals and IT implementation, the availability of hardware, software and network facilities in schools, staff development, the organization of IT co-ordination in schools and the difficulties encountered, teachers' and students' use of IT in teaching and learning both in school and at home, as well as their self-evaluation of their own IT competence. In conjunction with the SITES-M1 research, the University of Hong Kong also conducted a set of case studies: *Changing Classrooms and Changing Schools: A study of Good Practices in Using ICT in Hong Kong Schools (SITES-M2)* (Law et al., 2000), the focus of which was to identify cases of good practices on the use of IT in Hong Kong schools.

In the case of the ITEd project, there were three major local reports which were carried out with funding from the HKSAR. First, in April 1999, the EMB commissioned the Hong Kong Institute of Education to refine the four levels of IT competency for teachers as suggested in the "IT Five-Year Strategy" and to recommend assessment tools and professional development for IT competency for teachers (HKIED, 1999). This report delivered the recommendations on the four levels of IT competency for teachers, the core and optional course elements for appropriate professional development courses in order to attain these levels of IT competency, the methods/tools for assessment of the IT competency of teachers, and the certification mechanism. It acted as a reference for all Hong Kong teachers to reach different levels of IT competency during the strategy implementation in the following few years.

Second, as part of an interim evaluation of the ITEd, the EMB again commissioned the Centre for Information Technology in School and Teacher Education in the University of Hong Kong to conduct a Preliminary Study entitled '*Reviewing the Progress and Evaluating the Information Technology in Education (ITEd) Projects*' (Law et al., 2001). It was the first extensive study reviewing the ITEd development and covered a group of primary, secondary and special schools in Hong Kong.

One important finding was that there had been a great improvement in the provision of hardware, software and network due to the 'Access and Connectivity' policy from the ED. The IT skill levels of students and teachers had been increasing steadily due to the various initiatives. However, there were still obstacles and difficulties hindering the use of IT in teaching and learning. Insufficient instructional software and teacher

competence were two of the many factors identified. Nevertheless, a few schools had emerged successfully with innovative pedagogical approaches as a result of clear vision and good school leadership.

Lastly, in early 2003/2004, the EMB commissioned Hong Kong Polytechnic University to conduct the final study to evaluate progress in the ITEd Project (HKPU, 2005). Overall, the study found that it was undeniable that there has been huge progress in ITEd in Hong Kong schools, as reflected by the significantly improved infrastructure, the high proportion of staff trained, the emergence of a culture of using computers by school heads and teachers in their daily work, the widespread use of computers by students for learning as well as for other purposes, and the general perceptions of school heads, teachers, students, parents and other community stakeholders about the value and importance of ITEd.

Although the above studies were conducted for the ITEd projects, there are a number of reasons why the research presented in this thesis is relevant and timely. Firstly, all previous studies were funded by the Government. This is not to argue that the studies were subject to crude manipulation or distortion, but to recognise that the ability of the EMB to shape the studies through, for example, determining the terms of reference of a research project, can have a significant influence on outcomes. There was a strong argument for a more independent study. The non-Government University Education Concern Group which consists of over 50 academic staff from the 8 Universities of Hong Kong has, for example claimed that the EMB had used tight controls to restrain or prevent academics from expressing views critical of the bureau's policy in funded projects and requested a result which was favourable to the Government (Apple Daily, 2006).

Secondly, the latest of these studies was conducted in early 2003/2004, when the initial 5 year strategy had just been completed. It must be remembered that the ITEd initiatives have been in place for only five years and within those five years it has, of necessity, taken time for change to take place. Depending on the stage of development of each school, the actual period may be less than five years. This is consistent with international findings (Dwyer et al., 1990; Newhouse, 1999) that large scale change often takes up to five years to become established. There is a need for a more reflective study that takes account of how the policy has continued to have an impact beyond the narrow period of its implementation.

Finally, the focus of previous studies has been on the impact of the policy. Little

attention has been paid to the experience of implementation, that is the process of policy as well as the product (Taylor et al., 1997). This study seeks to fill the omission by also focusing on the process of policy implementation, and in particular how the paradigm shift in teaching and learning was promoted by using IT as a catalyst for change and how the policy's central components and the other factors have helped and hindered the implementation.

The result of the study can further the understanding of the current use of IT in primary education. IT in education will be reviewed to determine appropriate support for schools in terms of physical infrastructure, technical support and professional development. It is important to know how IT is presently put to use by teachers in primary schools and what an environment conducive to a greater use of IT in education would look like. The information gained from this study has practical importance for primary education research generally; that is, it provides evidence of the factors that facilitate or impede innovation in a school. In more substantive terms, this study generates guidelines for educational planning in primary education. It points to policy changes that are needed in order to maximize the effectiveness of teaching and learning and illuminates the process of policy implementation for major change.

Specifically, the study provides guidance for the direction that professional development programmes need to consider in order for them to feel supported in the new venture of using innovation through the use of IT in schools. Last, but not least, the intention is to make recommendations to improve the situations in schools. This is very important to the future of IT in Primary Education in Hong Kong.

1.4 Layout and Organisation of the Thesis

This chapter has presented background information on the introduction of the ITEd Strategy in Hong Kong. The research questions posed for this study were presented, followed by the significance of the study. Chapter 2 will present a review of the relevant literature related to this study. It will outline the education policy analysis approach based on the work of Bell and Stevenson (2006), identify the intended paradigm shift in teaching and learning and identify the factors which affect the implementation of IT by leaders/managers and classroom teachers. Chapter 3 will outline the research design undertaken. The dualism research approach using quantitative survey and qualitative interview methods is adopted. Chapter 4 will deal with the findings of the study and a discussion of these findings will follow in Chapter

5. The concluding chapter will provide a summary of the study, its implications and recommendations for the future direction of the ITEd Strategy in primary education in Hong Kong.

Chapter 2 Literature Review

ITEd is one of the major educational policies implemented by HKSAR. Policy can be clear or opaque. However, even when policy appears relatively clear when it is defined and formulated, as in the ITEd Strategy, it is rarely implemented uniformly or as the architects of policy might have intended. Policy changes as it is implemented and policy refracts as it passes from formulation to implementation (Taylor et al., 1997). This leads to a discussion of policy development and various analytical frameworks in Section 2.2.

In this study, the formulation and implementation of ITEd Strategy in Hong Kong has been analysed drawing on the framework suggested by Bell and Stevenson (2006) and Hirumi (2002). In Section 2.3, the social-political environment including the new national identity of Hong Kong, economic competitiveness and the need for pedagogical reform will be analysed. A discussion of the strategic direction such as an intended paradigm shift in teaching and learning, the provision of key components and distributed implementation of the ITEd Strategy proposed by the Government follows in Section 2.4. These two sections constitute the policy formulation phase.

This phase typically includes an attempt to assess as many areas of potential policy impact as possible, to lessen the chances that a given policy will have unexpected or unintended consequences. Because of the nature of some complex adaptive systems such as societies and governments, it may not be possible to assess all possible impacts of a given policy. Furthermore, the intended impact of policy changes will not be accepted unconditionally by institutions because an institution is by definition and in essence a stable, durable, and persistent human system. In some extreme cases, an institution can block change. According to Kirkman (2000, p.46), this can occur:

> *'through inaction, passive resistance or a political response – a change agent that doesn't promote change can become an agent of inactivity'*

Therefore, in order to bring about policy changes in different layers of an institution, policy analysts must take into account the persistence and resistance of institutions.

So, in Section 2.5, organizational principles of the ITEd Strategy at the school level, in particular, accountabilities, institutional values and commitments, and the teachers' role will be discussed. Lastly, in Section 2.6, operational practices and procedures of this policy carried out by schools such as IT infrastructure, teachers' professional

development, curriculum and resource support to help the integration of IT, and local partnerships will be discussed. These two sections constitute the policy implementation phase.

All these act as the foundation for, and inform the purpose and objectives of the present study. In Section 2.7, the link between the literature review and the research questions will be briefly described.

2.1 What is Policy?

There are many definitions of policy and these competing definitions require some further analysis. Policy can be said to refer to the principles that govern action which is directed towards given ends (Bangladesh, 1998). At the national level, policy embraces general goals and acceptable procedures and actions to achieve their goals. Policy provides a basis for legislation, plans and prescriptions, and a framework to continuously correct institutional inadequacies to maintain dynamic growth. A policy, thus, provides an important means to achieve goals which are considered essential and desirable by society. The effectiveness of a policy therefore, depends on achieving defined goals.

According to Jenkins (1993, p.30), policy is:

> *'a set of inter-related decisions taken by a political actor or a group of actors concerning the selection of goals and means of achieving them within a specified situation where the decisions should, in principle, be within the power of the actors to achieve'*

Jenkins's concept focuses on decisions and policy as being concrete, as opposed to Gordon et al. (1997) below who focus on a system or set of decisions that make up an episode. They view policy as:

> *'a dynamic system: policy making, like power, appears as a dynamic yet diffused element in the relations between public actors and the world on which they act. It thus is more helpful to talk about a policy system' (Gordon et al., 1997, p.9).*

Blakemore (2003, p.10) presents a definition of policies as '*…aims or goals, or statements of what ought to happen*'. This distinction between objectives and '*statements of what ought to happen*' echoes a similar distinction identified by

Harman (1984) between policies as statements of intent, and those that represent plans or programmes of work. In all these arguments, the emphasis is on policy as a product without considering the process. To them, the product is the effect of the policy and this is the most important aspect of implementing a policy. Kogan (1975) talks about policy as a statement of prescriptive intent.

Other definitions emphasize that policy is value-laden, with values permeating policy processes. Easton (1953, p.129) defines policy as: '*a web of decisions and actions that allocate value'*. According to (Prunty, 1984, p.136),

> *'The authoritative allocation of values draws our attention to the centrality of power and control in the concept of policy'*

There is a failure to see policy as both product and process (Taylor et al., 1997) and this conceptualization of policy is de-coupled from the context from which it is taken. Policy analysis within education must be capable of recognizing the many different levels at which policy development takes place, the myriad range of educational institutions involved and the importance of specific cultural contexts.

In this study, the focus was on the policy process – on the implementation of the ITEd Strategy in primary schools. The strategy consisted of a specific policy goal – the achievement of a paradigm shift in teaching and learning, four aspirational visions concerned with the development of attitudes and skills for life long learning. In addition, four key components were identified to assist the implementation of the strategy. These were the provision of IT facilities, teacher enablement and professional development, curriculum adaptation and resource support and the creation of local partnerships.

2.2 Policy Development and the Policy Process

The term, policy, may apply to government, private sector organizations and groups, and individuals. The term 'policy development' can be said to refer to the process by which policy emerges from a set of ideas to become the reality of what governments or organisations 'do'. The process of policy development can therefore be applied to all the stages that cover policy formulation to implementation. Policy analysis can be considered to be the study of this process, often seeking to explain how policies develop in the specific way that they do, and how they shift and change over time, and as they pass from 'up there' to 'down here' (Bell and Stevenson, 2006).

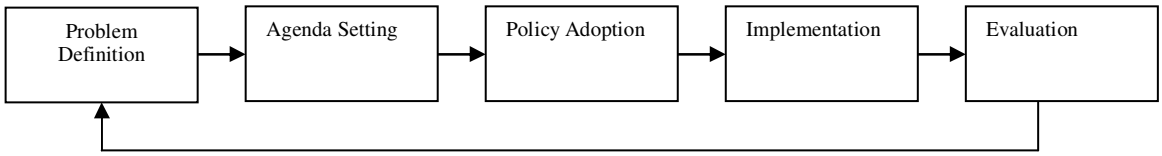
The implicit assumption in most policy analysis studies that once a policy has been formulated it will be implemented is invalid (Smith, 1973). In mature society, interest groups, opposition parties, and affected individuals and groups often attempt to influence the implementation of policy. Those who lead schools are in receipt of an externally determined policy directions but their individual experience also affects the implementation of the policy in their schools (Taysum and Gunter, 2008). Policy implementation is seen as a tension generating a resistance force in society. This resistance always exists and is perhaps unavoidable. Morrison (1998, p.122) has specifically identified the four significant barriers to change as follows:

- *Value barriers, where the proposed change challenges one's values system or if one does not agree with the proposed values;*
- *Power barriers, where people may accept an innovation if it brings them greater power, or they may resist it if it diminishes their power;*
- *Psychological barriers, where people resist the challenge to security; confidence, emotional well-being and homeostasis that changes brings;*
- *Practical barriers, where people will resist change if it threatens to de-skill them, if the investment in re-skilling is too daunting, or if resources are insufficient to support the change.*

The policy process passes through a variety of stages and can take place at a number of different levels. Ball (2006) classified the study of this kind of phenomenon as a policy trajectory study which employs a cross-sectional rather than a single level analysis by tracing policy formulation, struggle, compromise and response from within the state itself through to the various recipients of policy. Policy development therefore is not a simple case of understanding the priorities of governments or individual school leaders. Policy may be seen as a dialectic process in which all those affected by the policy will be involved in shaping its development. Policy development is therefore both a continuous and a contested process in which those with competing values and differential access to power seek to form and shape policy in their own interests.

So, the life of policy is a dynamic and open-ended process (Northern California Grantmakers, 2006). It is often viewed as complex and convoluted because there is often not a clear effect from any one particular strategy. Policy changes in stages, in waves of momentum rising and building to create a change. Due to its complexity and unpredictability, no one group or organization can control the policy process. While policy development does not always occur in a linear, logical way, some tools can

help us understand the process and be more effective policy advocates. The framework suggested by Northern California Grantmakers (2006) below shows how policies are often created, whether they target a clearly defined problem such as poor high-school graduation rates, or a broader issue such as racial inequality.



(Figure 2.1) Policy framework suggested by Northern California Grantmakers

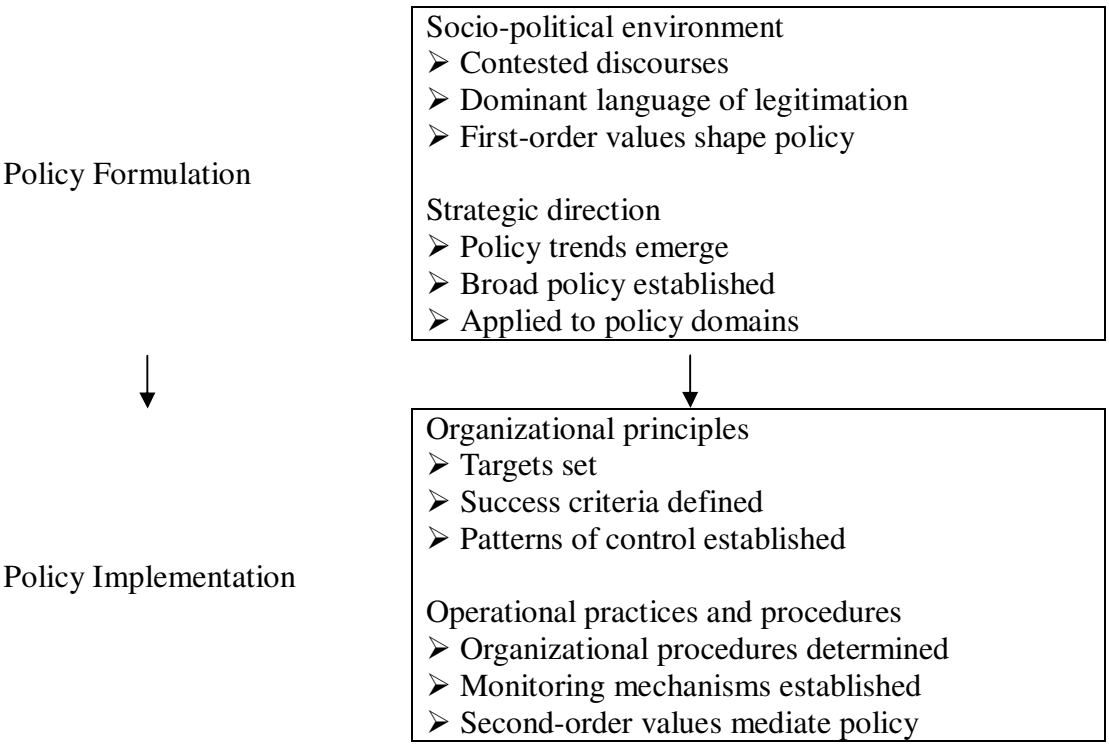
In this model, policy development starts with problem definition. During this stage, a problem is identified and examined, and possible solutions are explored through research and analysis. During the agenda setting stage, efforts are used to raise the profile of the problem and possible solutions among the public and decision-makers. Policymakers at the policy adoption stage then discuss options and possible solutions and adopt new or amend existing policy. The implementation phase is often ignored because it is not as visible to the general public. Implementation is an essential phase during the time critical decisions are made which ultimately determine the policy's effectiveness. After a policy is implemented, it is important to evaluate its effectiveness. Policy research and analysis are strategies to evaluate whether the policy meets its original intents and if there are any unintended outcomes. If the policy is not successful on any level, evaluation findings can be used during a new phase of problem definition. The policy life cycle begins again and continues until an effective policy is created and successfully implemented.

Bowe et al. (1992) argue that the linear and sequential model presented above, and often associated with traditional pluralist analyses of policy is an over-simplified model of the policy process that fails to reflect the complexity and 'messiness' of policy formulation and implementation. Adopting a similar approach, Taylor et al. (1997) argue that policy is both product and process; it changes constantly and is still being made, and re-made, as it is being implemented.

An alternative approach is developed by Bell and Stevenson (2006) in which each of the phases of formulation and implementation are sub-divided into two further sub-phases. The model presented in Figure 2.2 therefore has four levels: the *socio-political environment* from which policy, based on the dominant discourse, is derived and within which its over-arching guiding principles are formulated; the *strategic direction* which emanates from the socio-political environment and which

broadly defines policy and establishes its success criteria as they apply to spheres of activity such as education; *organizational principles* which indicate the parameters within which policy is to be implemented in those spheres of activity; and *operational practices*, based on the organizational principles, which are the detailed organizational arrangements that are necessary to implement the policy at the institutional level and to translate such policy implementation into institutional procedures and specific programmes of action.

Thus, in terms of translating policy into practice, the four levels are in a hierarchical relationship, the first two being concerned with policy formulation and the second two with policy implementation. The four levels are nested (Barr and Dreeben, 1983) in the sense that educational policy, derived from the wider socio-political discourse, is mediated through the formulation of a strategic direction in the national and regional context which, in turn, generate organizational processes within which schools are located and curriculum content, pedagogy and assessment determined.



(Figure 2.2) Policy framework suggested by Bell and Stevenson

By recognizing the importance of the wider socio-political environment to any policy, the factors affecting Hong Kong in shaping the discourse within the ITEd Strategy debate was conducted. From within this discourse, a strategic direction developed in which the ITEd Strategy become more clearly defined and success criteria are then established. As policy texts emerge with greater clarity, this in turn shapes the

organizational principles, and ultimately the operational practices, that shape the experience of policy at an institutional level. The schools receiving the ITEd Strategy may interpret its content differently (EMB, 1998a), so this policy may be understood as a plurality of policies that emerge and develop as the policy process moves from formulation to implementation. To what extent does the ITEd Strategy solve the problems for which it was created? It is important to focus on the individual educational institution because this is the point that represents the interface between the wider policy environment, the teachers and the individual learners. Those leaders and managers working in institutions are both make sense of policy from outside, and generate and implement policy within institutions working with classroom teachers. These are not disconnected processes. This leads to a study of the organization principles, and operational practices and procedures of the policy implementation stage in schools, which is the main focus of the thesis. The details of applying this framework to the present study will be discussed in Sections 2.3-2.6.

2.3 Identifying the Socio-political Environment

An analysis of the debates within the socio-political environment that give rise to educational policy can facilitate a more detailed understanding of the context element of the policy. To integrate technology successfully into their teaching, educators may recognize and be prepared to work in this environment with all of its subtleties and complexities. Our school education should be alive to the various opportunities and changing needs of the information age (EMB, 1998a, Section 1.2), so it is necessary to understand the three factors, which lies behind such educational change namely *the new national identity of Hong Kong*, e*conomic competitiveness and the pressure of globalisation, and* s*ystem modernisation and the need for pedagogical reform*.

2.3.1 The New National Identity of Hong Kong

After the change of sovereignty in Hong Kong, on the one hand, the new SAR government wanted to keep the political atmosphere as stable as it could by adopting the ‘One Country, Two Systems’ concept and on the other hand encourage the educational atmosphere to be as innovative as possible (HKSAR, 1997). The new SAR government believed that educational innovations were the best means to remove the influence of colonial rule which had been rooted in Hong Kong people's mind. In his first Policy Address (HKSAR, 1997), the Chief Executive outlined the vision of developing new morals and values of Hong Kong's young people as well as contributing to the regions’ economic competitiveness:

> *It is important that we educate our young people, so that they master the knowledge and skills needed to make a living and to contribute to society. But this is far from being the only aim of importance. Knowledge and skills can propel economic growth, but our goal goes beyond this. Our goal is to become a community that is both rich and warm of heart, both free and united, both sophisticated and culturally confident. This calls for more than mere knowledge and skills. (p.35)*
>
> *….For many years, Hong Kong has been set apart from the Mainland. We have lived in a society and a cultural environment very different from the Mainland. As we face the historic change of being reunited with China, for every individual, there is a gradual process of getting to know Chinese history and culture, so as to achieve a sense of belonging…… (p.37)*

As an inseparable part of China and an international city, the new Government preferred to have:

> *'an education system that preserves the good tradition of our nation but which at the same time gives our students an international outlook and enables them to learn, work and live in different cultural environments' (Education Commission, 2000, p.35).*

The use of information technology in education to provide the students with a vast world of learning resources and perspectives was regarded as a policy to attain this cultural change (EMB, 1998a, Section 1.4).

2.3.2 Economic Competitiveness and the Pressure of Globalisation

It has become widely recognized that the future prosperity of nations will depend on their ability to be internationally competitive (Brown and Lauder, 1997).

Human Capital is usually measured by examining the level of skills and knowledge of the recipients such as members of a firm or a cohort of school students. To develop an economy based on high technology requires a strong back-up from the educational sector. The HKSAR Government is bent on developing information technology as one of the generic skills in education, so that young people can be equipped with modern technology skills before they leave schools (Education Commission, 2000, p.88).

Furthermore, when the financial crisis rocked Hong Kong in 1997, the stock market

crashed and the prices of property dropped seriously. The HKSAR Government has come to realise that its economy can no longer rest on the property market. The world has entered a new epoch, an information technology age. Knowledge is the new capital and IT is the way to store, transfer and utilise knowledge. Survival as a thriving economy requires high productivity especially in 'new industries' such as financial services, creative and value-added industries, and these all require the use of IT. The Government has decided to lead the territory towards high technology development or it will lag further behind other countries.

2.3.3 System Modernisation and the Need for Pedagogical Reform

The third aspect of the socio-political environment affecting the formulation of the ITEd Strategy is the need for a modernized education system and pedagogical reform. It is increasingly argued that technological innovations over recent years, both in the wider society and within the classroom may require changes in the ways we think about and practise education today. There is a perceived need to provide for life-long learning in the knowledge-based era and to ensure continuous improvement of students' ability to improve as learners. It is argued that dramatic gains in student learning will be achieved after appropriate pedagogical reform (Kirkman et al., 2002). The main focus of this reform is considered to be the need for a paradigm shift from a teacher centred to a student centred approach to learning. Future pedagogical improvement may therefore relate to: advancing problem and enquiry-based learning; preparing students for the acquisition of life-long learning skills; and enabling students to expand the utilization of IT in learning processes.

2.4 Developing the Strategic Direction of the ITEd Strategy

The ITEd Strategy in Hong Kong passed through the policy formulation and implementation stages (EMB, 1998a; EMB, 2004a; EMB, 2004b). As the policy framework suggested by Bell and Stevenson was acting as the conceptual framework for this research, relevant themes for the four stages of the framework were identified and connected to the Hong Kong context.

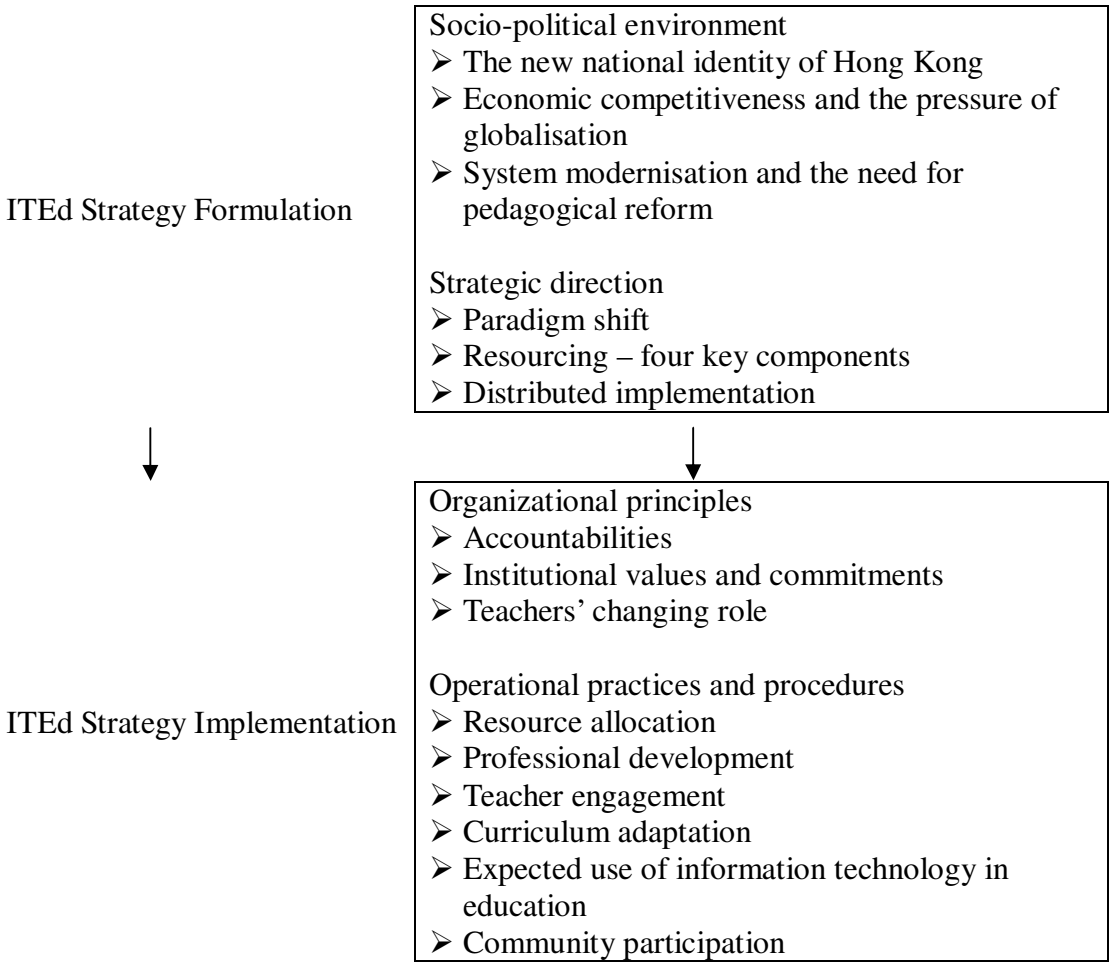
The three factors, namely *the new national identity of Hong Kong*, e*conomic competitiveness and the pressure of globalisation, and* s*ystem modernisation and the need for pedagogical reform* were identified as the themes for the socio-political environment. From this discourse, the themes in the strategic direction of the ITEd Strategy were identified by referencing to the policy documents (EMB, 1998a) and

they will be discussed in detail in this section. Since the ITEd Strategy is a policy that enables different schools to make their own decisions on implementation (EMB, 1998a), the success of the initiative depended on the detail of schools' implementation. The themes for the implementation - organizational principles, and operational practices and procedures were then identified as the bases for data collection according to the broad discussion in the literature. The themes in this implementation stage were particularly relevant to investigate in this study and they will be discussed in detail in Section 2.5 and 2.6.

The strategic direction which emanates from the socio-political environment and which broadly defines policy and establishes its success criteria as they apply to education in Hong Kong will be discussed in this section.

The strategic direction of the ITEd Strategy is indicated in the *IT Five-Year Strategy* document which states explicitly that the ITEd is '*part and parcel of the overall education reform*' (EMB, 1998a, Section 1.3). It becomes clear that the ITEd does not stand-alone; it is part of a wider strategy for change within the education system. These education policies project images of an ideal society and definitions of what counts as education (Ball, 1990, p.3). In order to improve economic competitiveness and modernise the education system under the new national identity of Hong Kong, the dominant strategic direction took the form of a paradigm shift in teaching and learning which was to be achieved by the provision of four key components and distributed implementation.

Figure 2.3 below illustrates how the strategic direction emerged from the discourses that shaped the ITEd Strategy and subsequently developed the organizational principles and practices which will be discussed later in this Chapter. Evidence for the strategic direction of the strategy was collected from the ITEd Strategy documents (EMB, 1998a; EMB, 1998b; EMB, 2004a; EMB, 2004b) and will be presented in this Section. Evidence for the strategy implementation phase will then be collected from primary principals via survey and interview. By doing this, the overall picture of the current situation in schools can be generated by the survey result, and more in-depth information can be collected by the interviews.



(Figure 2.3) Application of Bell and Stevenson's Model to Hong Kong ITEd Strategy

2.4.1 Paradigm Shift

As revealed in Chapter 1, the vision of the ITEd Strategy was to '*bring about a paradigm shift in the delivery of school education - from a largely textbook-based teacher-centred approach to a more interactive and learner-centred approach*' (EMB 1998a, Section 8.1). Specifically, the aims of promoting IT in education were (EMB 1998a, Section 1.4):

> *(1) to turn our schools into dynamic and innovative learning institutions where students can become more motivated, inquisitive and creative learners;*
>
> *(2) to link up our students with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global outlook.*
>
> *(3) to develop in our students capabilities to process information effectively and efficiently;*
>
> *(4) to develop in our students the attitude and capability for independent life-long learning.*

These aims reflect the perceived importance of cognitive and social-constructivist learning theories on which the ITEd Strategy is based. It can be seen that the student is expected to play a much larger role in their own learning. The achievement of the primary goal of the strategy required a fundamental shift in teaching and learning from a teacher centred to a more learner centred approach. This required primary school principals and teachers to make a radical shift in their thinking and to develop rich learning environments that help to translate the philosophy of constructivism into actual practice (Hirumi, 2002).

Teacher-centred learning strategies according to Harden and Crosby (2000, p.335) entail a focus on the teacher transmitting knowledge, from the expert to the novice. There are some advantages of the teacher-centred learning approach. For example, this approach is efficient and effective for lower-level learning, especially in large groups. However, the approach has been found to be inadequate for many students. The teachers focus on what they want the students to learn and may restrict what the students might learn. The teachers put more emphasis on the acquisition of factual knowledge rather than conceptual understanding and developing students' learning skills. Therefore, students tend to be passive learners during the learning process. The traditional transmission teaching methods lead in most cases to superficial rather than deep learning and the persistence of student misconceptions.

In contrast, Harden and Crosby (2000) describe learner-centred learning as focusing on the students' learning and '*what students do to achieve this, rather than what the teacher does*'. Woolfolk (1993, p.485) argues that a key idea in this constructivist learning process is that:

> *'students actively construct their own knowledge: the mind of the student mediates input from the outside world to determine what the student will learn. Learning is active mental work, not passive reception of teaching'.*

In this approach, the learners actively integrate new ideas with prior knowledge so that:

> *'information is turned into knowledge by means of interpretation, by actively relating it to existing bodies of knowledge, by the generative creation of representations, and by a process of purposeful elaboration' (Tam, 2000, p.56).*

In a social constructivist learning environment, in which co-operative group work is practised, students interact with other students as well as their teachers to clarify their understanding.

Achieving this intended paradigm shift is very challenging for leaders/managers, classroom teachers and their students. This is demonstrated by Hirumi (2002) who has drawn a useful comparison (*Appendix 1*) between teacher-centred and learner-centred approaches to teaching and assessment. The table provides useful guidance for the teacher designing a learner centred, technology rich learning environment. As the table illustrates, in the learner centred approach, teachers are required to adopt strategies which support students to become more autonomous learners. These include: an increased emphasis on helping students to learn how to process information and develop higher order thinking skills such as critical and creative thinking and problem solving and developing interdisciplinary knowledge through project work (Learning Outcomes); the involvement of students in setting their own learning objectives based on their prior learning (Goals and Objectives); the development of students' learning strategies based on their individual learning needs (Instructional Strategy); using formative assessment in the classroom by involving students in the assessment of their own and peers' work and setting targets for improvement. (Assessment); the provision of a wide range of flexible learning resources which students can access with the support of the teacher (Teachers' Role); students taking more responsibility for their own learning and becoming active knowledge seekers (Students' Role); and finally, students having access to multiple resources and working in groups to complete appropriately challenging tasks (Learning Environment).

The primary question in this research is to establish whether the '*paradigm shift in pedagogy from a textbook-based teacher-centred approach to a more interactive and learner-centred approach*' has been achieved in the implementation of ITEd Strategy (EMB, 1998a). So, the parameters listed in the table by Hirumi (2002) can be used to evaluate the extent to which there was a paradigm shift in the classroom based on the use of IT.

In fact, the reasons why Information Technology has been proposed as a vehicle to achieve the paradigm shift in teaching and learning in primary education in Hong Kong (EMB, 1998a) is linked to what Hirumi (2002) suggested. Firstly, technology helps students to access a wide range of information beyond the classroom; IT can provide students with a vast range of learning resources and perspectives on them (ICP, 2003; Blatchford and Whitebread, 2003). Secondly, since extensive information

is available, students are encouraged to develop their own learning skills by the facilitation of classroom teachers to critically and intelligently seek, absorb, analyse, manage and present information (ICP, 2003; Duda 2005). Thirdly, with less direct instruction from teachers, creativity from the students is encouraged since their knowledge is no longer limited to what the teachers teach. The students have freedom to explore their interests and such exposure will provide the stimulus for the development of a creative mind (ICP, 2003; Kozma, 2005). Lastly, with the aid of information technology such as e-Learning tools, each student can develop his/her own individualized learning path by controlling the pace of progress and develop habits of self-learning, which will benefit him/her for life (ICP, 2003; Blatchford and Redecker, 2008).

2.4.2 Resourcing – Four Key Components

In order to support the implementation of the strategy, the government provided a significant injection of funding to improve the infrastructure with the provision of hardware, IT literate personnel and technical support. More software was also made available. The government also arranged for a large scale programme of professional development for teachers.

In 1997, the Government announced a series of IT initiatives costing $2,880 million in capital cost and $260 million in annual recurrent cost. They included providing 65,000 computers for primary and secondary schools, over 45,000 training places for teachers, internet access for all schools, preparations for an education-specific Intranet, and a pilot scheme in 10 primary and 10 secondary schools.

The ITEd, strategy marked a significant departure in the implementation of IT in education at both primary and secondary levels in Hong Kong. In his 1998 Policy Address, the Chief Executive announced a further set of initiatives at an additional capital cost of $334 million and annual recurrent cost of $294.5 million. This included deploying an IT co-ordinator per school in 250 schools, enhancing technical support for all schools, and a grant for schools to make available computer facilities for use by students after school hours (EMB, 1998a, Section 8.6). Specifically, the key resource components of the ITEd Strategy were:

Access and Connectivity (EMB 1998a, Section 3)

This was intended to ensure that students had a sufficient level of hardware and more

access to the internet, in order to enable them to acquire a broad knowledge base. All primary and secondary schools were given computers to upgrade the facilities in their computer rooms. A sound network infrastructure for teachers and students was also emphasised, and a Local Area Network (LAN) was developed in each school to link up the library, staff rooms and computer rooms.

Teacher Enablement (EMB 1998a, Section 4)

The EMB regarded teachers as important agents to maximize the outcomes of the use of IT in teaching and learning. Continuous efforts were to be made to train the teachers and IT training places at different levels provided to improve IT teachers' IT competence. Individual schools were also given flexibility to acquire training for their own teachers.

Curriculum and Resource support (EMB 1998a, Section 5)

The EMB aimed to support the school curriculum through IT. In order to achieve this target, the old curriculum needed to be revised to integrate the use of IT. In addition, the EMB also planned to provide more resource support, especially software products.

Fostering a Community-wide Culture (EMB 1998a, Section 6)

This can be regarded as an intended cultural change at a macro-level. Various parties, such as school heads, teachers, students, parents, tertiary institutions, were encouraged to become actively involved in embedding IT in the schools. This was to be achieved by developing courseware, supporting students and providing technology, initiating strategies to link schools and other institutions via technology.

2.4.3 Distributed Implementation

The ITEd, strategy, was not a detailed strategy in which schools were required to implement practices dictated from above. Rather, the HKSAR allowed individual schools to develop strategies to meet the needs of their own students and staff while achieving specific targets in the four areas outlined above. Accordingly, the implementation of the strategy and impact of IT was expected to vary widely across different schools.

As the policy document stated:

> *This strategy is not meant to be implemented in a top-down manner or adhered to without flexibility. Quite the contrary, schools should formulate their own IT plans tailored to their specific needs, in the true spirit of school-based management. It is for the same reason that we are carrying out the IT pilot scheme to identify best practices and strategies for schools in Hong Kong….. (EMB, 1998a, p.24)*

A policy which is open to differing interpretation by practitioners is likely to result in differences in implementation. Such differences will be magnified, as the unique conditions prevailing in each institution further shape the implementation of the policy. Distortions and gaps appear in the implementation process, resulting in what is best described as 'policy refraction' (Taylor et al., 1997).

2.5 Developing the ITEd Strategy – from Formulation to Implementation

Policy is about the power to determine what gets done, or not done. These are profoundly political issues. The process of implementation and outcomes of policies are complex and multi-dimensional, involving conflict between the perspectives of interests of those involved which result in:

> *'intended as well as unintended consequences because they occur in a complex interrelationship of contextual factors, different and sometimes opposing interests, linguistics ambiguities and the variety of key players involved in policy processes' (Taylor et al., 1997, p.17).*

Sabatier and Mazmanian (1995) also explain that *'implementation is the carrying out of a basic policy decision. …The implementation process normally runs through a number of stages:*

1. *beginning with passage of the basic status,*
2. *followed by the policy output (decisions) of the implementing agencies,*
3. *the compliance of the target groups with those decisions, the actual impact, both intended and unintended of those outputs,*
4. *the perceived impacts of agency decisions, and*
5. *finally, important revisions (or attempted revision) in the basic status'* (Sabatier and Mazmanian, 1995, p.153).

Whittaker (1993) argued that although education policies are typically initiated by

Government, changes in educational practice still have to come from practitioners themselves, rather than through regulation. In other words, although teachers have to respond to centrally imposed guidelines which relate to the curriculum, pedagogy and assessment, the effectiveness of changes ultimately derives from the efforts of practitioners themselves rather than from legislation or regulations.

In Hong Kong, since it was possible to implement the ITEd Strategy differently in individual schools, there is a need to study the organisational principles of the schools. This requires a consideration of accountabilities, institutional values and commitments, and teachers' changing roles at the school level.

2.5.1 Accountabilities

The school-based management approach - 'School Management Initiative (SMI)' was introduced into Hong Kong schools in 1991 to enhance the accountability of individual schools (Education Department, 1991). It means that the schools need to be held accountable to their clients: students, parents and the local community. Generally speaking, any change in school may serve to improve student learning and school practices and to ensure equity and access.

At a school level, principals play a vital role in setting the institutional values and commitments for the implementation of the ITEd Strategy and thus introducing the required changes in schools. Their values and beliefs in the potential of information technology in education have a great influence on the success of the implementation. Kearsley and Lynch (1992) observed that the ability to develop and articulate a vision of how IT could produce instructional changes is a critical element in IT leadership. Law et al. (2003) discovered that a school environment which supports curriculum innovation and reform was a strong contributing factor towards the success of IT implementation. This in turn is highly dependent on the principal who is always the final decision maker of Hong Kong primary schools.

With the introduction of school accountability, HKSAR Government officers identified intended student learning outcomes and components of the ITEd Strategy but left decisions of whom, when, what, where and how to implement the strategy at the school level to the management decision in individual school. The schools were able to prioritise the agenda of IT in Education accordingly and set their own pace.

However, as Sergeant (2001, p.33) asserts when discussing the problem of introducing

new ideas into school:

> *'the change problem shifts to the human problems of dealing with the resistance, anxieties, threats to morale, conflicts, disrupted interpersonal communications and so on, which prospective changes in patterns of practice evoke in the people affected by the change'.*

In fact, history has shown that even the most current, capable technology resources offer no quick, easy, or universal solutions. Computer-based materials and strategies are usually tools in a larger system and may be integrated carefully with other resources and teacher activities. This places a special burden on already overloaded principals and teachers to continue learning new resources and changing their teaching methods. Educators may not be able to predict the future of educational technology, but they know that it will be different from the present; that is, they may anticipate and accept the inevitability of change and the need for a continual investment of their time (Poole et al., 2006).

2.5.2 Institutional Values and Commitments

Teachers' Beliefs about the Use of IT

Some educators, parents and students believe the reasons for using technology seem so obvious that everyone can recognize them. Their common sense rationale is based on two major beliefs; technology is everywhere and therefore should be in education, and some researchers have shown how and where computer-based methods are effective (Resnick, 2002). Both of these commonly held beliefs have some validity and both provide rationales for using technology. In support, Dwyer (1994, p.4) argued that IT can provide:

> *'an array of tools for acquiring information, and for thinking and expression and that the learning experiences will enable students to live productive lives in the global, digital, information-based future they all face.'.*

On the other hand, some teachers are hesitant to immerse their students in IT enabled learning environments because they are not confident that IT will benefit their students (Healey, 2005; Schmidt and Callahan, 1992; Drier, 2001).

Some teachers are concerned by the change in their status in the classroom when IT is

being used. When students begin to work independently on the new machines, it may bother some teachers that they are no longer the focal point of their classrooms (Tiene and Ingram, 2001). Teachers are also reluctant to reveal to students their lack of computer skills (MacMillan et al., 1997). Often, the student teachers' computer use was much lower than what they themselves perceived (Wang, 2001). Teachers may see the influx of IT threatening, in the sense that:

> *'they may be concerned about not knowing enough how to work with the technology or may even be afraid of breaking expensive equipment. Some may surely be troubled that their students knowing more about the technology than they do' (Tiene and Ingram, 2001, p.259).*

Teachers' Readiness for Change – the Implementation of IT

According to Eacute and Esteve (2003, p.3),

> *'Teaching has changed. Today, more complex teaching activities are evolving to cope with changed classroom circumstances. Some teachers cannot, or will not adopt them as their own'.*

In the case of IT, for many teachers, a lack of thoughtful, comprehensive, and systematic implementation plans for using the array of new technologies available is a major reason for the resistance to change (Cuban, 2001). In particular, they need adequate time and resources to learn how to use the powerful technologies with their students; they need support from experts in learning how to integrate the new technology into their daily classroom activities; they need equipment to be maintained by technical assistants.

Fear of change and commitment among teachers is the bottleneck affecting the use of the technology (Crane, 2000). Geisert and Futrell (2000, p.318) also claim that:

> *'technological innovations can die, not on lack of merit but because of their challenge to the status quo'.*

As Waugh and Punch (1987) argue, resistance to change is likely to occur if the innovation is incompatible with teachers' existing attitudes. In Hong Kong, the idea of changing from a teacher-centred environment to a learner-centred one by adopting IT is very challenging, comes slowly and the need for the change may be disputed by the

teachers themselves. Their beliefs, values and norms about the job of teaching and on how students' best learn are quite often different from those of policy formulators.

2.5.3 Teachers' Changing Role

Preparing young people for their future roles in society is an unquestionable responsibility of all teachers in Hong Kong. There has been much speculation about the future role of teachers. However, a consensus is emerging on two consequences of current changes in ITEd: (a) the continuing shift of responsibility from teacher to student and (b) the indispensable role of IT in learning (Law, 1999). The new role of acting as facilitators of learning may pose a particular challenge to teachers in Hong Kong because they are so used to adopting a teacher-centred teaching style in an examination-driven education system 'where teaching to the test' is the norm.

For teachers to effectively integrate IT into classroom practice, they may make two radical changes (Fabry and Higgs, 1997). Besides learning to use technology, they may fundamentally change how they teach. To fully maximise the benefits of IT, teachers need to move away from a teacher centred classroom to a more student centred classroom: they become activity builders, and creators of new learning environments (Ravet and Layte, 1997).

According to Sandholtz et al. (1997), teachers selected for IT pilot projects usually begin by using IT to support existing teaching approaches such as Powerpoint presentations and develop to adopt strategies that involve students' participation such as co-operative learning. As teachers advance, their use of technology becomes more frequent, complex and flexible (Hadley and Sheingold, 1993). Sandholtz et al. (1997) noted that teachers in the 10 year 'Apple Classrooms of Tomorrow (ACOT)' project passed through five developmental stages (entry, adoption, adaptation, appropriation and invention) as they developed. In order to move up the five stages, teachers need to be confident about using IT and be able to produce creative resources. For some teachers, the required change in pedagogy may be as difficult as using technology in the classroom. In the face of this double challenge, many teachers adopt an avoidance strategy especially when they do not receive enough support or if there is a lack of role models (Evans-Andris, 1995).

In summary, in this initiative, a change of mind set and culture involving teachers and students was required which was always going to be both contentious and difficult (Papert, 1993).

2.6 Policy Implementation – from Principles to Practices

Organizational principles indicate the parameters within which policy is to be implemented in those spheres of activity. As external policies are implemented in institutions, and as institutions develop their own organizational policies, actors in the process will seek to shape, and sometimes challenge policy. Operational practices and procedures of the ITEd Strategy will be discussed in this section.

The operational practices examined in the section which follows are: *Expected Use of Information Technology in Education, Resource Allocation, Professional Development, Teacher Engagement, Curriculum Adaptation, and Community Participation*.

2.6.1 Expected Use of Information Technology in Education

Internationally, new technologies have spread at an unprecedented speed (Ravet and Layte, 1997). All these innovations generate the potential for exploitation by education and the transformation of pedagogical practice.

In terms of its functionality, IT can be related to learning in four different modes in modern education (Lau, 1998). These are learning about IT, learning from IT, learning with IT and managing learning with IT. In the mode of 'Learning about IT', the emphasis is on students learning to use IT according to their ability level. In the mode of 'Learning from IT', IT is used either to tutor or to drill the students; usually, a tutorial package is involved when the computer is used to tutor a student. Drill-and-practice software is used to provide additional practice on specific skills. The flow of information here is mainly unidirectional, from the computer to the student. In the mode of 'Learning with IT', the flow of information is bi-directional which involves interactions between the students and the computers. In the mode of 'Managing learning with IT', the school administrators and the teachers use IT to assist their school administration duties and their daily work, and the students can use IT to manage their own studies.

In another dimension, Taylor (1980) proposed that all educational applications of computers could be placed in one of three major classifications: tutor, tool and tutee. With this categorisation scheme, the computer takes on four different roles, namely as a medium for teaching and learning, as an assisting tool, as an object and as a tool for organisation and management in schools (Merill et al., 1996; SER, 1998; Moonen and

Kommers, 1995; Pilot, 1998).

In the ITEd Strategy, no explicit mention was made about what the role of IT may play in the schools. Instead, the policy provided some examples of application of IT in teaching and learning: exploring mathematics concepts in a Primary 4 Mathematics lesson, cross-cultural studies in a General Studies lesson on a Primary 5 class, an inter-regional project in Geography lesson in a Secondary 3 class, research project in Economics lesson of Secondary 6 class and mutual support among teachers to run a teaching resource database (EMB, 1998a). In these examples, the use of IT was remaining at the low level of the educational applications of computers. It did not suggest the managing learning with IT or as a tool for organisation and management in schools.

2.6.2 Resource Allocation

Although there are only 539 primary schools in Hong Kong, the resources of each vary a great deal. Due to the background of the school management board, some schools were very rich and had sufficient resources to implement the ITEd Strategy. On the other hand, some schools lacked even very basic IT resources because of insufficient student numbers. Apart from hardware and software, manpower is also a valuable resource in any school. This again varied between the schools. Some had plenty of teachers who were skilful in using IT in education, while some others were very reluctant to adopt the changes.

With the exception of some core hardware and software supply, the resources supplied by the Government to Hong Kong schools took the form of cash funding. Due to the promotion of school-based management, the principal of the schools were allowed to allocate the cash to different areas of ITEd or even other non-IT aspects such as language teaching activities in their schools. As a result, some principals had the option to allocate the funding which was originally intended for IT to other areas, while some were able to ‘top up’ the government finding with their own. Within the ITEd budget, the principals also had absolute freedom to allocate the resources to different needs, such as software, hardware or manpower.

2.6.3 Teachers' Professional Development

According to Thomas Payzant:

> *'effective use of technology ultimately depends on the knowledge and skills of the teacher, the person with the greatest impact on the classroom environment' (Heck and Wallace, 1999, p.20).*

Education is increasingly affected by changing technology, but teachers are generally much less equipped to anticipate and cope with change; hence the importance of continuing professional development. The focus may not only be on technical training in the use of IT but also on how IT can be used to enhance teaching and learning in a cognitive and social-constructivist learning environment. Creighton (2003) explains that if the focus of professional development is on technical training, the outcome could be only the acquisition of technical skills and little understanding of IT integration.

It is said that it is very important that teachers should appreciate the need for using IT in education and be receptive to the challenge of taking up a new role as learning facilitator, working alongside rather than simply 'using' computer technology (Mumtaz, 2000). Specifically, he concludes that the 'teacher factor' involves teachers' pedagogical beliefs, collaboration and interaction with their peers, technical competence and attitude towards technology. Professional development such as teacher enablement training, peer assistance and sharing are some of the means schools could have adopted. In the case of the ITEd Strategy, opportunities for professional development were provided centrally but schools had freedom to make their own arrangements. Schools were able to appoint any training providers to provide training services to their teachers according to their own schedule, budget and medium of instruction required. All they needed to follow was the centrally suggested course outlines and to complete all the training within a defined target date.

2.6.4 Teacher Engagement

Colley et al. (2002) claimed that the term teacher engagement refers to the learning and practice of teachers within the new learning environment of their workplace. Teacher engagement generally refers to a combination of teacher characteristics related to teacher knowledge and teacher motivation. Attitudes of teachers towards the

use of the ITEd Strategy were likely to vary and thus their motivation in relation to the intended change would also be different. For technology to be used successfully as an instructional tool in the classroom, teachers had to be willing and able to construct pedagogically sound reasons for doing so (Hughes and Zachariah, 2001; Kirkman, 2000). Teachers were likely to be willing only if their hearts and minds were touched (Hawley, 2002).

Roblyer and Edwards (2000) argued that one of the reasons technology is not working as well or as efficiently as many had hoped, is that too frequently technology is chosen for inappropriate reasons. These include: because the school has it on hand; the teacher next door is using it; the principal likes it; or it is part of the school culture. None of these reasons is necessarily inappropriate, but if the use of technology is to improve, teachers may recognize the difference between a technology solution that makes a difference and one that is an inessential add-on.

In practice, the systematic integration of the computer into classroom activities across subject areas is rarely found at the school level. This was typified by the situation in Belgium where the implementation of computer use in schools had not reached the level of 'routinisation' in secondary schools (Braak, 2001). For a lot of teachers in the 90s in France, computers were still tools for specialists (Grandbastien, 1992). The computers were mainly used for administrative activities and teachers were able to ignore them. In the Netherlands, Brummelhuis and Plomp (1994) found that the use of the computer depended very much on the individual teachers and was not embedded in the curriculum of existing subjects.

It is argued that the hindrances to a greater use of IT in teaching were insufficient computers, insufficient usable software, lack of knowledge and insufficient time to introduce the technology (Brummelhius and Plomp, 1994; Lee, 2001; Matengu 2006). Teachers have inadequate opportunities for training and poor access to technology. In addition, classroom demands of various kinds – class size, a heavy teaching schedule, other teacher responsibilities unrelated to teaching, detract from a teacher's commitment to computer-based teaching and learning (Poole, 1997).

McFarlane and de Rijcke (1999) also pinpointed the impediment to the proposed change imposed by current educational practices and assessment procedures in many developed countries. In particular, the over-reliance on the assessment of a fixed body of knowledge often leaves little room for the open ended application of IT.

2.6.5 Curriculum Adaptation

In terms of scope of use, IT can be used in different ways in individual subjects or across the curriculum. Careful planning usually leads to IT being used to support aspects of courses where it can make the maximum impact. Generally, the three main uses of IT are as productivity tools, in specific subjects and as cross-curricular tools (SEED, 2000). Using IT as productivity tools is very popular nowadays. For example, students can use electronic spreadsheet packages instead of a calculator to perform mathematical tasks. Students can also use certain multimedia presentation software to present the findings of their projects. Computer-assisted instruction programmes such as drill-and-practice, tutorial, and simulation software can effectively reinforce learning in specific subjects. Students who are competent in IT have an intellectual resource that can be used in mathematics, science, art, social science, and physical education classes.

It is argued that when educational technology is used in teaching and learning, the curriculum must be changed to match the requirement of the new pedagogies (Roblyer and Edwards, 2000). Technology may become an integral part of the new curriculum to make education more efficient, exciting, and successful. Specifically, school management may consider 'what are we teaching now that we can teach better with technology?' and 'what can we teach with technology that we could not teach before but that should be taught?' In the ITEd Strategy statement, these decisions have been left to schools' own decision. The schools can decide to adopt to use information technology in a particular year, subject, topic or lesson (EMB, 1998a).

2.6.6 Community Participation

Education takes place not only in schools but also within families, communities, and society. Despite the various degrees of responsibilities taken by each group, none can be the sole agent to take 100% responsibility for educating children. Parents and families cannot be the only group of people for children's education as long as their children interact with and learn from the world outside their families. Communities and society may support parents and families in the upbringing, socializing, and educating of their children. Schools are institutions that can prepare children to contribute to the betterment of the society in which they operate, by equipping them with skills important in society. Schools cannot and should not operate as separate entities within society (Uemura, 1999). Since each group plays a different role in

contributing to children's education, there may be efforts to make a bridge between them in order to maximize the contributions. Education takes place most efficiently and effectively when these different groups of people collaborate.

In the ITEd Strategy, parents, tertiary institutions, the business community and community bodies were identified by the Government as potential partners in the ITED implementation at the school level. It was envisaged that: parents could encourage and guide their children to take up a more active role in learning with the assistance of IT; tertiary institutions could serve as a good source of expertise and impetus for the school sector; the business community could provide educational discounts in respect of hardware, Internet service, teaching and learning software and electronic reference material; and community bodies such as public library and youth centres could increase the supply computers and internet access in community facilities to help bridge the gap between the 'haves' and 'have-nots' in terms of accessibility to IT resource (EMB, 1998a).

2.7 Development of the Research Questions

As presented in Chapter 1, some studies of IT in education policy in the Asia and Pacific Region have been conducted by the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2006). However, Hong Kong is not included in the scope of its study. Instead, some past studies of ITEd Strategy in Hong Kong have been conducted locally. The funding of this research was provided by the Government and their focus was on the outcomes of the strategy. Based on the results of these research studies, the Government claimed that the policy was successful (EMB, 2004a). There was a gap in the recent local studies about the ITEd Strategy which rarely mentioned the stage of policy implementation. In fact, the author doubted that the implementation of the policy had reached the target of achieving a paradigm shift in teaching and learning in primary education despite the huge investment. As a result, the proposed research questions in Section 1.2 were developed.

The preceding literature review has been synthesized around the research questions of this study.

By recognizing the importance of the wider social-political environment, the factors which shaped the discourse within the ITEd Strategy debate in Hong Kong were explored in Section 2.3. From this discourse, the strategic direction of the ITEd Strategy imposed by the HKSAR and the success criteria were discussed in Section

2.4. These two sections correspond to the first two levels of Bell and Stevenson's model (2006), i.e. policy formulation.

Since the ITEd Strategy is a policy that enables different schools to make their own decisions on implementation, the success of the initiative depended on the detail of schools' implementation. So, the aspect of policy implementation of the ITEd Strategy was discussed in Section 2.5 and 2.6, in order to establish a foundation for the study of the research questions for this study.

The institutional values and commitments of a school can have a considerable influence on any educational policy imposed on that school. Within a school, the principal is the school leader and his/her beliefs and attitudes towards the ITEd Strategy may have a higher influence on the implementation of the policy compared with other stakeholders of the schools. These lead to the research sub-questions (1) and (4).

Other stakeholders can also exert an influence on any educational policy. Classroom teachers are especially important in this respect. As discussed earlier, the teachers' role is changing from directly teaching students to facilitating students' learning. This in turn, depends on the availability of teacher professional development and the degree of teacher engagement in individual schools. School-based resource allocation, curriculum adaptation and community participation are other central components which contribute to policy success. These lead to the research sub-question (2).

The effectiveness of policies implemented in different schools will be affected by the local parameters of the individual schools in a certain extent. So, research sub-question (3) will study the specific school characteristics in Hong Kong which may affect the implementation of the ITEd Strategy.

In evaluating the implementation of the ITEd Strategy, it is necessary to collect information and data pertaining to the policy, and to measure and analyze them by using some rational methods. For the collection of data, both survey questionnaires and interviews with school principals were used. This will be discussed in detail in the next chapter.

Chapter 3 Research Methodology

Research is *'a focused and systematic enquiry that goes beyond generally available knowledge to acquire specialised and detailed information, providing a basis for analysis and elucidatory comment on the topic of enquiry'* (Johnson, 1994, p.3). Knowledge about education, one of the areas in the social sciences, is also expanded by research studies. The term educational research is used for such studies; to be more precise, it *'is best preserved for work in which the central organising feature is a dominant commitment to the field of education. If the research focus is the concerns of a discipline, the work ought to be seen as related to that discipline and so named. The research may be relevant to education but still not be educational research.'* (McGaw, 1996, p.62).

The present educational research uses the 'Information Technology in Education Strategy in Hong Kong Primary Schools" as a case study. Bassey (2003) claimed that a case study can be defined as a research strategy, an empirical inquiry that investigates a phenomenon within its real-life context. Case study research implies single and multiple case studies which rely on multiple sources of evidence and benefits from the prior development of theoretical propositions. Case studies can be based on any mix of quantitative and qualitative evidence. Tellis (1997) has identified numerous examples that have used case study techniques extensively, particularly in government and in evaluative situations. The government studies were carried out to determine whether particular programmes were efficient or if the goals of a particular programme were being met.

Many well-known case study researchers such as Simons (1980), Yin (1984) and Stake (1995) have written about case study research and suggested techniques for organizing and conducting the research successfully. Drawing on their work, Soy (1997) has proposed six steps that may be used in case study research:

- *Determine and define the research questions*
- *Select the cases and determine data gathering and analysis techniques*
- *Prepare to collect the data*
- *Collect data in the field*
- *Evaluate and analyze the data*
- *Prepare the report*

(Soy, 1997, p.1)

For the first step outlined by Soy, the research questions in this study have been

determined and defined in the previous chapters. The second to fourth steps of Soy's outline will be reported in this chapter and are detailed below.

The research type in this study will be justified in the first section of this Chapter. In order to collect data for the study and conduct appropriate analysis, different research paradigms will be discussed and justified. Different data collection methods have different advantages and disadvantages (Faulkner et al., 1991). It is essential that the methodology to be used for data collection and analysis should be appropriate for the topic, time framework (McMahon, 1993), and nature of the study (whether it is predictive, exploratory or explanatory) (Faulkner et al., 1991). So, the data collection methods, sampling selection, instrument design, data analysis and feasibility of the study will be presented later.

3.1 Research Type – Evaluative Case Study Research

Before conducting the research, there was a need to identify the research type of this policy research case study. Policy research refers to the analysis of existing or prospective policies. One common methodology is to define the problem and evaluation criteria, identify all alternatives, evaluate them and recommend the best policy option.

Gordon et al. (1997) identify several types of policy research, each of which falls within a continuum which they characterize as either *analysis for policy*, or *analysis of policy*.

- Analysis for Policy -
  - Policy Advocacy - refers to research which aims to promote and advance either a single specific policy, or a set of related policies.
  - Information for policy - this type of research aims to provide policy makers with information and advice.
- Analysis of Policy -
  - Policy monitoring and evaluation - this is a common form of policy research, particularly in the current climate of high level accountability and the need to justify actions undertaken.
  - Analysis of policy determination - here the emphasis is very much on the policy process - not on the impact of policy, but on how policy developed in the precise way that it did.
  - Analysis of policy content - this research is conducted more for academic interest rather than public impact and here the emphasis is on understanding

the origin, intentions and operation of specific policies.

The present case study falls into the category of analysis of policy. The emphasis is on the policy process – how ITEd Strategy was implemented in the schools and how can it be improved in the future.

From another view, research that helps educational policy improve educational practice consists of three kinds of studies (CEPA, 2006), including policy formation studies that examine how policy is made, policy implementation studies that examine how policy is put into practice, and policy effect studies that examine the consequences of policies. In this study, the research is a hybrid of policy implementation and policy effect studies.

Among the various research approaches such as ethnographic research, correlational research, ex post facto research, action research, etc (Cohen and Manion, 1989; Jaeger 1988; Maykut and Morehouse, 1994; Punch, 1998), the present research project followed the principles of what Charles (1998) called 'Evaluation Research'. He argued that evaluation research is *'typically done to determine the effectiveness of given products, procedures, programmes, or curricula' and 'intended to resolve local school concerns or questions'*. Fitzpatrick et al. define *'evaluation as the identification, clarification, and application of defensible criteria to determine an evaluation object's value (worth or merit) in relation to those criteria'* (Fitzpatrick, 2003, p.5).

The generic goal of most evaluation research is to provide useful feedback to a variety of audiences including sponsors, donors, client-groups, administrators, staff, and other relevant constituencies. It can be used to help people to understand the extent of the problem or need that exists and to set realistic goals and objectives in response to such problem or need. It is frequently deployed in the public sector but is equally applicable to other kinds of organizations. Most often, feedback is perceived as "useful" if it aids in decision-making. But the relationship between an evaluation and its impact is not a simple one; studies that seem critical, sometimes fail to influence short-term decisions, and studies that initially seem to have no influence, can have a delayed impact when more congenial conditions arise. Despite this, there is broad consensus (Trochim and Donnelly, 2007) that the major goal of evaluation should be to influence decision-making or policy formulation through the provision of empirically-driven feedback.

There are many different types of evaluations depending on the object being evaluated and the purpose of the evaluation (Trochim and Donnelly, 2007). The most important basic distinction in evaluation types is that between formative and summative evaluation. Formative evaluations strengthen or improve the object being evaluated; they help form it by examining the delivery of the programme or technology, the quality of its implementation, and the assessment of the organizational context, personnel, procedures, inputs, and so on. Summative evaluations, in contrast, examine the effects or outcomes of some object; they summarize it by describing what happens subsequent to delivery of the programme or technology; assessing whether the object can be said to have caused the outcome; determining the overall impact of the causal factor beyond only the immediate target outcomes; and, estimating the relative costs associated with the object. As Peters (1986) commented, '*the final stage of the policy process is the assessment of what has occurred as a result of the selection and implementation of a policy, and, if it is found necessary, a change in the current policies of government*' (Peters, 1986, p.133). Kerr also explained, '*to be sure, policy researchers should give much attention to policy outcomes, as their role is to uncover what seems to work. And policies themselves should be evaluated in part on their outcomes*' (Kerr, 1976, p.212). Summative Evaluation informs decision makers about whether the activities and strategies were successful in helping the project and/or its participants reach their goals. This type of evaluation also describes the extent to which each goal was attained (Arow, 1995).

In this study, while the data collected was used to evaluate the extent to which the ITEd objectives have been achieved, the analysis of this data was used to consider the implementation process, implications of levels of IT penetration in HK schools for teaching and learning purposes and the potential impact of IT penetration on shifting paradigms of learning for the information age from the view point of Primary School Principals. The aim of the research was to provide useful feedback to different stakeholders involved in the ITEd Strategy, by seeking the principals' perceptions of the process of implementation and the impact of the strategy. This was achieved using interviews to supplement the use of a survey questionnaire which yielded broad generalisations. The present case study could be perceived to be located within both summative and formative evaluation perspective.

The research paradigms and data collection methodologies will be discussed in detail in the following sections. The methodology used to gather the data should be a specified step-by-step procedure. It should be carefully designed and executed to ensure the data is accurate and valid.

3.2 Research Paradigm – Dualism Approach

Generally, it can be argued that our view of the world is shaped by our beliefs and purposes and these form our paradigms. Guba and Lincoln (1994, p.116) stated that *'paradigm issues are crucial; no inquirer, we maintain, ought to go about the business of inquiry without being clear about just what paradigm informs and guides his or her approach'*.

A paradigm may be defined as: *'the entire constellation of beliefs, values, and techniques shared by members of a given scientific community'* (Kuhn, 1970, p.75). Within social science, based on the philosophical assumptions assumed, there are two distinct and dominant paradigms of research. One is based on the scientific method and: *'aims at objectivity, standard procedures and replicability'* (Johnson, 1994, p.7), and is often referred to as the positivist paradigm. The other, the interpretive paradigm, is based on the idea that there is no objective truth, and that *'all human life is experienced and indeed constructed from a subjective point of view, and that social research should seek to elicit the 'meaning' of events and phenomena from the point of view of participants.'* (Johnson, 1994, p.7).

Positivist Paradigm

A positivist methodology is based on the use of the scientific method and seeks to 'discover' general laws explaining the nature of the reality that the researcher is observing and recording. Positivism has been the main research paradigm for the past several centuries. Examples of research studies carried out from the positivist philosophical viewpoint can be found in Benbasat et al. (1987) and Yin (1994b).

The key idea of positivism is that the researched world exists externally and aspects of it can be measured through objective methods. *'Knowledge is only of significance if it is based on observations of this external entity.'* (Easterby-Smith et al., 1994, p.77). In positivist thinking, a social reality exists and it is possible through empirical research to establish sets of social 'facts'. There is an attempt to identify causality. The implications are that the observer is independent of what is observed and that the research is value free.

Positivism has grown from the supposition of how science progresses, building in steps on what is known. This approach has, however, been criticised for its treatment

of organisational reality, which is regarded as complex and not easily amenable to statistical deduction. It is also regarded as being too deeply rooted in functionalism and too concerned with causal analysis at the expense of getting close to the phenomenon being studied (Galliers, 1991). Positivism is based on the notion of pure observation, which is impossible in research, especially in the social sciences, since observations are always subject to measurement errors (Anderson, 1983). It is also claimed that scientific breakthroughs may result from creative breakthroughs - *'Science seldom involves a straightforward logical sequence. Instead, it involves some guesswork, competition, rivalry and lucky breaks. It is a process of investigation which does not rely on mere technique.'* (Burgess, 1993, p.1).

Interpretive Paradigm

Over the last century, another research paradigm has emerged in the social sciences to break out of the constraints based on statistical deduction imposed by positivism. With its emphasis on the relationship between socially-engendered concept formation and language, it can be referred to as the interpretive paradigm. This approach may be used where complex issues are involved in research where the interplay of social, cultural and political factors has meant that methods such as life history, interview and observation have been judged the most appropriate methods of research. The stress has been on the subjective reality for individuals. In this approach, *'the principal concern is with an understanding of the way in which the individual creates, modifies and interprets the world in which he or she finds himself or herself.'* (Cohen and Manion, 1994, p.8). Interpretive researchers admit that their own knowledge claims are clearly a function of social, cultural, and cognitive factors that impinge on their research (Peter and Olson, 1983).

Through a variety of qualitative methods, it is considered possible to build up a picture of a social 'reality'. Such a view is opposed to a strictly positivist view, which is more often associated with purely quantitative methods. In interpretive research, *'the task of the social scientist should not be to gather facts and measure how often certain patterns occur, but to appreciate the different constructions and meanings that people place upon their experience.'* (Easterby-Smith et al., 1994, p.78).

The interpretive approach may be exemplified by the phenomenologist who believes that it is the subjective experience of the individual that is important and that it is individual perception that bestows meaning, rather than there being any external objective meaning. This stems from the view that *'the world and 'reality' are not*

objective and exterior, but that they are socially constructed and given meaning by people.' (Easterby-Smith et al., 1994, p.78). People act on the basis of the sense that they individually make of a situation, rather than acting directly in response to external stimuli. It is assumed that all human action is meaningful *'and hence has to be interpreted and understood within the context of social practices.'* (Usher, 1996, p.18).

Dualism approach adopted in this study

The two research paradigms are two different ways of looking at the world. The relationship between these paradigms has been described as 'uncomfortable co-existence' and 'a state of tolerance and struggle' (Soltis, 1992). However, there is considerable disagreement as to whether these research paradigms are necessarily opposed or can be accommodated within one study (Lee, 1989). Statements of the two extreme approaches mask the fact that, in practice, the approaches need not be mutually exclusive and are often used together. Actually, some researchers often adopt a model that is a combination of the two approaches: *'a growing body of social research takes a stand somewhere between the two schools of thought. It is recognised that no piece of social research can be entirely objective, since no researcher is value free. Even in an overtly rigorous quantitative, head-counting study, some implicit decisions have already been made as to which are worth counting.'* (Johnson, 1994, p.7). Gunter (2005) recognized that the pluralistic nature of the world will result in the use of a combination of methods. Miles and Huberman (1994) substantiate this view, '*… we have to face the fact that numbers and words are both needed if we are to understand the world*' (Miles and Huberman, 1994, p.40).

Elsewhere, Denzin (1978, p.291) defines '*the combination of methodologies in the study of the same phenomenon*' as triangulation. Triangular techniques in the social sciences attempt to map out, or explain more fully, '*the richness and complexity of human behaviour by studying it from more than one standpoint and, in so doing, by making use of both quantitative and qualitative data*' (Cohen and Manion, 1994, p.223).

In this study, both quantitative and qualitative approaches were used for triangulation. The purpose of using the multi-method approach was two-fold. First, it was to cross validate the data generated to ensure that they were not simply artefacts of one specific method of collection (Campbell and Fiske, 1959; Lin, 1976). Second, methodological triangulation (Denzin, 1970) was intended to capture a '*more*

complete, holistic and contextual portrayal of the unit under study' (Jick, 1983, p.138). The qualitative method allows for the illumination of contextual elements and better elicitation of data, which are not plausible with the quantitative method. Thus, in the present study, the interview method was employed to probe a few further issues concerning the opinions of the respondents to the IT policy in Hong Kong. It was hoped that the understanding of the issue could be enriched for '*…the use of multiple measures may also uncover some unique variance which otherwise may have been neglected by single method*' (Jick 1983, p.138).

3.3 Phase One of the Research – Quantitative Method

The quantitative method generally converts observations into discrete units that can be compared to other units by statistical analysis; it focuses on measurement, explanation, prediction and proof. *'Quantitative research is, as the term suggests, concerned with the collection and analysis of data in numeric form. It tends to emphasise relatively large-scale and representative sets of data, and is often, presented or perceived as being about the gathering of facts'* (Blaxter et al., 1996, p.61).

It is claimed that quantitative methods can achieve high precision through quantitative and reliable measurement, and are replicable. Through careful sampling and design, control can be easier. By using statistical techniques, it allows for sophisticated analyses and the production of causality statements through the use of controlled experiments.

On the other hand, quantification can become an end in itself. It leads to the assumption that facts are true and the same for all people all of the time. It fails to take account of people's unique ability to interpret their experiences, construct their own meanings and act on these. Because of the complexity of human experience, it is difficult to rule out or control all the variables. Its mechanistic ethos tends to exclude notions of freedom, choice and moral responsibility. It is not totally objective, because the researcher is subjectively involved in the very choice of a problem as worthy of investigation and in the interpretation of the results. Quantitative research often produces banal and trivial findings of little consequence due to the restriction on and the controlling of variables (Burns, 2000).

3.3.1 Quantitative Survey by Questionnaire Adopted

In order to obtain thorough information on a given area of study, quantitative survey,

the most commonly used descriptive method in educational research was used in the Phase 1 of this research. This was selected because, according to Jaeger (1988), there are some characteristics in research studies which are suitable for using survey:

- Researchers are interested in specific facts that describe a large group.
- The groups that are of interest are well defined.
- Researchers want to know something about the present conditions of a group, rather than something about what would happen if they changed something.

Typically, surveys gather data at a particular point in time with the intention of (a) describing the nature of existing conditions, (b) identifying standards against which existing conditions can be compared, or (c) determining the relationships that exist between specific events (Cohen and Manion, 1994). Thus, surveys may vary in their levels of complexity from those which provide simple frequency counts to those which present relational analysis.

In this study, data was collected to reflect the existing situation of ITEd in Hong Kong's schools. It was used to evaluate the extent to which the ITEd objectives stated by the government have been achieved. The analysis of this data was also used to consider the implications of levels of IT penetration in HK schools for teaching and learning purposes and the potential impact of IT penetration. These objectives suggested that the use of a survey study was a suitable means.

Survey by questionnaires is a structured procedure for questioning respondents by means of printed questions. Each question is asked exactly the same way each time which increases the reliability of the data. A questionnaire is also much more efficient in that it requires less time, is less expensive, and permits collection of data from a much larger sample. In addition, the questionnaire allows respondents to take their time in answering, gives privacy in responding, allows respondents to complete questionnaires at their convenience and insulates the respondents from the researcher's expectations and subjectivity (Mangione, 1998).

A questionnaire was chosen for this research because this was a cross-sectional survey; data would be collected across different segments at a particular time. Also, most of the data for this survey would be reported rather than observed. So, in order to give time for the respondents to collect the information, it was felt more appropriate to leave them to report via the questionnaire rather than being asked in person. Given

that it was felt that only the management or school head could obtain such data easily, it was decided that they would be the target respondents. Also, it was felt that as well-educated individuals, they may be able to self-administer the questionnaires themselves.

The response rate to questionnaires is generally lower than that of interviews (Hopkins and Antes, 1990). However, due to the lower costs involved, the number of respondents who can be reached is higher and it was hoped for this study that this would offset the expected poor return rate. It is also the case that IT in education is currently an issue of interest and concern of many educators, and that they would be interested in influencing policy direction in this area; accordingly, their interests may already be directed towards completing and returning such a questionnaire.

3.3.2 Sample Selection – Population Targeted

From the web site of EMB, in the academic year 2007/08, there were altogether 1129 schools in Hong Kong; of these, 539 were primary schools, 528 were secondary schools and 62 were special schools. It was impossible due to time constraints and limited resources to use all schools for this study. Also, there was a fundamental difference between primary, secondary and special schools, so sampling from them was not considered. Only primary schools were being targeted to make it more reasonable for generalisation of the findings for primary education.

The unit of analysis for the research was based on a single school; therefore each school was required to fill in one questionnaire.

As Cohen and Manion said, *'…due to factors of expense, time and accessibility, it is not always possible or practical to obtain measures from a population'* (Cohen and Manion, 1989, p.101). However, if the whole population can be used, the result obtained will be much more reliable, especially when the return rate is low. This decision seemed appropriate as surveying the whole population would result in a maximal number of potential respondents, which in turn reduces the sampling error (Cohen and Manion, 1994). Sampling error increases with the decrease in the size of the sample. Although sampling is less costly and can be done more quickly than a census, the participation of individuals from the entire population permits the researcher to avoid the risk of obtaining a non-representative sample of respondents. This, moreover, allows applying the methods of inferential statistics with a minimal risk of error. In view of this, it was planned that the whole population of 539 primary

schools would be selected as target respondents.

In order to save the printing and postage fee, the questionnaire was faxed to the personal fax machine of the principals directly. All the questionnaires were addressed to the school head rather than directly to any individual. By doing so, it was hoped that the principals would be able to reply to the questionnaire themselves. However, in reality, it was unavoidable that some principals might assign appropriate staff to help to collect the necessary data or even to fill-in the questionnaires on their behalf.

3.3.3 Response Rate

For this survey, the Total Design Method (TDM) developed by Don Dillman was referenced (Dillman, 1978). TDM has been successful in securing high response rates from general and special samples. Dillman explains the goal of this method as follows:

> *'The appeal of the TDM is based on convincing people first that a problem exists that is of importance to a group with which they identify, and second, that their help is needed to find a solution. The researcher is portrayed as a reasonable person who, in light of the complexity of the problem, is making a reasonable request for help, and, if forthcoming, such help will contribute to the solution of that problem. The exchange the researcher seeks to establish is broader than that between him or herself and the questionnaire recipient, that is, if you do something for me, I'll do something for you. Rather, the researcher is identified as an intermediary between the person asked to contribute to the solution of an important problem and certain steps that might help solve it. Thus the reward to the respondents derives from the feeling that they have done something important to help solve a problem faced by them, their friends, or members of a group including community, state, or nation, whose activities are important to them.' (Dillman, 1978, p.162-3)*

Response rates in mail surveys are quite varied, ranging from as low as 10 percent to as high as 90 percent (Fraenkel and Wallen, 1996). Willimack et al. (2002) state that the response rate for a mail survey can reach 50% to 60% but Neuman (2006) finds that it always fall between 10% to 50%. Saunders et al. (2003) argue that due to the factor of respondents' questionnaire fatigue, a response rate of 10% to 20% for contemporary research surveys is very common. As a general rule, with only a few exceptions, long questionnaires result in less response than short questionnaires (StatPac, 2007). Response rate is the single most important indicator of how much confidence can be placed in the results; a low response rate can be devastating to a

study. Therefore, the questionnaire used in this study needed to be designed as concisely as possible. Furthermore, the questions needed to be simple and to the point by using simple and direct language. This was done in the study to reduce misunderstandings and make the questionnaire appear easier to complete.

In this case, in order to encourage the selected samples to respond to the survey, the effects of the four factors in maximizing the response rate (Hoinville and Jowell, 1978, p.131) was also considered seriously. What they suggested for the initial mailing was the use of a good-quality envelope, and the selection of Monday or Tuesday for posting out the questionnaire, so that the respondents can receive it on Tuesday or Wednesday, etc.. In this study, mailing was not used but a good layout of the questionnaire was prepared and the days of faxing were Tuesday and Wednesday. Secondly, the design of an appropriate covering letter was completed. Thirdly, the samples were informed that after the survey was finished, a copy of the summarised survey report would be sent to them. These provided incentives for them to complete the questionnaire. Finally, in case the response rate was unsatisfactory, after a certain period of faxing out the questionnaires, reminders would be faxed to all schools to remind them to fax back the questionnaire if they had not done so.

In this study, since the whole population instead of a particular sample group was surveyed, it may already be good enough for generalization and prediction purposes, if a 10% response rate was achieved.

3.3.4 Instrument Design

In order to increase the trustworthiness of the responses, as well as the percentage of returns, it was decided that all questionnaires should be completed anonymously with neither respondents nor schools being identified on the research instrument.

The questionnaire included questions asking about basic information and the opinion of respondents. The questions on raw facts can help to obtain the exact answer, say '*age of school is 20*', for our numerical analysis. The questions about opinion could allow the respondents to express their ideas more intuitively, say '*number of computers in school is sufficient*', for our analytical analysis.

In order to help people complete the questionnaire easily, it was designed to be attractive, precise and concise, and easy to respond to. It was composed mainly of structured questions with a list of alternative responses for the respondent to select.

Specially, the widely used scale in survey research, a five-point Likert scale (Likert, 1932) was used in some of the questions. When responding to a Likert questionnaire item, respondents specify their level of agreement with a statement. If they do not have any position or cannot decide for a level of agreement, they can select "neither" as their response. In other questions where a Likert scale was considered to be inappropriate, a checklist of options was given for the respondents to select. The list of alternatives tried to include all possible responses, and each possible response was distinct from the rest. In some cases, if the respondent could not find a suitable answer from the list, s/he had the option of providing a written response. Therefore, an "other" category with a space for the subject to write what s/he wanted was included as well.

Informal Interview

Two former IT coordinators (ITC) of primary schools were invited for an informal interview. In the interview, some basic ideas for the instrument were consolidated and possible options for questions in the questionnaire were explored.

Pre-test Questionnaire

After designing the questionnaires, pre-testing of the questionnaire was carried out. For the details of this questionnaire, please refer to *Appendix 2*. This yielded data concerning instrument deficiencies as well as suggestions for improvement. Three individuals with relevant ITEd experience and research experience were selected. Specifically, one of them was an IT trainer of in-service primary principals and teachers, one of them was IT trainer of in-service secondary principals and teachers, and the last one was course administrator of a college and had been a primary teacher.

First of all, they were invited to help in this exercise. An explanation of the purpose of the study and a brief of the background information was given to them. The questionnaires were sent to them and they were allowed sufficient time to read and comment. Afterwards, we sat together and talked through the questionnaire part by part. From this exercise, both the general feelings and the specific comments about the questionnaire were obtained. Since they were not the principals in the primary schools, they did not hold a view from this side, but they were able to comment on this survey from the point of a potential respondent. They suggested that the questionnaire should be shortened by removing some irrelevant questions and appropriate grouping of some questions should be made to improve the readability of the instrument.

Pilot Survey

For the details of the subsequently revised instrument and the cover letter, please refer to *Appendix 3*. It was then given to 5 principals of secondary schools for a pilot survey. The piloting was mainly used to collect data from the respondents to find out the clarity of instructions and items, to improve the validity by employing item analysis techniques and to estimate the reliability (Allen and Yen, 1979; Trochim and Donnelly, 2007). The principals were selected from the secondary schools with which I have close contact and I know each of them. Given that the potential sample for the questionnaire was all principals in all primary schools, it was felt that it would be unwise to use them as the pilot samples as it may have subsequently had a detrimental effect on returns of the final questionnaires. Since both secondary and primary schools were involved in implementing the ITEd Strategy (EMB, 1998a), this pilot allowed respondents to complete the questionnaire under the same conditions and speaking from the same position as the target population. Three days were given to them for completion of the questionnaire. They were encouraged to make comments and suggestions concerning directions, recording procedures, and specific items. The principals felt that the font size used in the questionnaire was too small to read, the conciseness could be improved and some technical jargon should be avoided. Feedback from them was carefully studied and considered. Proposed data tabulation and analysis procedures were applied to the data completed by the principals. The end product of this pilot survey was the finalised instrument ready to be sent to the selected subject samples and a framework for coding and analysing the data generated from this instrument.

Final Questionnaire

After the pilot survey, the questionnaire was further revised to produce the final questionnaire which is listed in *Appendix 4*.

Prior to reunification with China, English was an extremely popular language in Hong Kong, functioning as the only official language of Government. However, since 1997, due to the aforementioned political pressures, the Chinese language has increasingly become more central to public and daily life. The Chinese language, then, is increasingly promoted as the medium of instruction in Hong Kong schools. From the EMB web site, EMB, in the academic year 2007/08, approximately 90% of primary and 80% of secondary schools are now using Chinese as the medium of language of the classroom. So, to deal with the language constraint, the final questionnaire was translated to the Chinese version for the respondents and is listed in *Appendix 5*.

3.3.5 Data Analysis

As Youngman explains *'At the risk of disillusioning many readers, the first truth of research analysis is that it does not start the day after the last item of data is collected… the analytical strategies must be planned early in the research processes… Deciding upon the actual research procedure will determine the precise nature of the practicable analyses.'* (Youngman, 1978, p.3). So, proposed data tabulation and analysis procedures were applied to these data received.

Data was analysed after carrying out the data collection procedures. The response rate for each item in each question was given when presenting the results of this survey. In addition to simply determining choices, relationships between variables were investigated by comparing responses on one item with responses on other items.

Tool for Analysis

Upon receiving the questionnaires, the responses were entered into a computer. The data were analyzed using SPSS, as this software allows for a wide range of statistical techniques.

Descriptive Statistics

Numerical information can be classified into two basic ways, categorical or quantitative data. Categorical data differ in kind, but not in degree or amount, e.g. the number of teachers who completed different level of IT training. Quantitative data, on the other hand, differ in degree or amount, e.g. the number of computers in school. Since the data obtained can be classified into these two main categories, the information can be analyzed and presented differently.

Mean, median, standard deviation and the confidence interval for the mean were the major types used to describe the central tendency and dispersion of the data in this survey.

Independence Testing

In this study, dependence between different variables such as age of the school and the use of IT were explored. More generally, it can be said that variable Y is 'not correlated with' or 'independent of' the variable X if more of one is not associated with more of another. If two categorical variables are correlated, their values tend to move together, either in the same or opposite direction.

In this study, the commonly used Pearson's product-moment correlation coefficient was used to examine whether or not two variables were independent. Several authors have offered guidelines for the interpretation of this correlation coefficient. Cohen (1988), for example, has suggested the following interpretations for correlations in research in the following table.

Correlation	Negative	Positive
Small	-0.29 to -0.10	0.10 to 0.29
Medium	-0.49 to -0.30	0.30 to 0.49
Large	-1.00 to -0.50	0.50 to 1.00

(Table 3.1) Interpretations of correlation coefficient

As Cohen himself has observed, however, all such criteria are in some ways arbitrary and should not be observed too strictly. This is because the interpretation of a correlation coefficient depends on the context and purposes.

Qualitative Analysis

The findings obtained from the open-ended questions in the questionnaire were also used to '*supplement, validate, explain, illuminate, or reinterpret quantitative data gathered*' (Miles and Huberman, 1994, p.10) with the data being analysed in respect of the research questions of the study.

3.4 Phase Two of the Research – Qualitative Method

In contrast to the quantitative method, the qualitative method examines peoples' words or actions in narrative or descriptive ways more closely representing the experiences of the people involved. It focuses on understandings, meanings and takes seriously lay accounts and concepts.

In qualitative approach, because of closer researcher involvement, the researcher gains an insider's view of the field. This allows the researcher to find issues that are often missed (such as subtleties and complexities) by the scientific, more positivistic enquiries. Because statistics are not used, but rather qualitative research uses a more descriptive, narrative style, this research might be of particular benefit to the practitioner as she or he could turn to qualitative reports in order to examine forms of knowledge that might otherwise be unavailable, thereby gaining new insight. A qualitative description can play the important role of suggesting possible relationships,

causes, effects and dynamic processes, and this approach adds flesh and blood to social analysis (Hancock, 2002).

There are also limitations of using a qualitative approach. The problem of adequate validity or reliability is a major criticism. Because of the subjective nature of qualitative data and its origin in single contexts, it is difficult to apply conventional standards of reliability and validity. Contexts, situations, events, conditions and interactions cannot be replicated to any extent nor can generalisations be made to a wider context than the one studied with any confidence. The viewpoints of both researcher and participants have to be identified and elucidated because of issues of bias. Actually, a researcher's presence has a profound effect on the subjects of study. Issues of anonymity and confidentiality present problems when selecting findings. In actual implementation, the time required for data collection, analysis and interpretation is lengthy (Burns, 2000).

'Qualitative Research is concerned with collecting and analysing information in as many forms, chiefly non-numeric, as possible. It tends to focus on exploring, in as much detail as possible, smaller numbers of instances or examples which are seen as being interesting or illuminating, and aims to achieve 'depth' rather than 'breadth" (Blaxter et al., 1996, p.61). So, a qualitative method is adopted in Phase 2 of the study to supplement the findings by quantitative method in Phase 1.

3.4.1 Qualitative Semi-Structured Interview Adopted

In general, an interview is a two-way conversation initiated by the interviewer for the specific purpose of obtaining research-relevant information. The interview reflects the social constructivist stance '*regarding knowledge as generated between humans, often through conversations*' (Cohen et al, 2000, p.267). Kvale sees interviews: as an interchange of views between two or more people on a topic of mutual interest; based around a centrality of human interaction for knowledge production; and with an emphasis on the social situatedness of the research data (Kvale, 1996).

An interview differs from a questionnaire where the respondent is required to report or record in some way his/her responses to pre-set questions. The direct interaction of the interview is the source of both its advantages and disadvantages as a research technique. The advantage is that it allows for greater depth than is the case with other methods of data collection. The disadvantage is that it is potentially prone to subjectivity and bias on the side of the interviewer, although this could also be said of

questionnaire methods.

Cohen and Manion (1994) provide a detailed summary of the relative merits of an interview compared with a questionnaire. They claimed that interviewers are required to conduct interviews and this causes the major expenses of an interview. For a questionnaire, only clerks are required to process the information and the major expense is postage and printing instead. The opportunities for personalization and asking are extensive in an interview but relatively limited in a questionnaire. Furthermore, the opportunities for probing in an interview are possible but are rather difficult by questionnaire. Although the rate of return in an interview is high, the number of respondents who can be reached via a questionnaire is much more extensive. Sources of error in an interview may come from the interviewer, instrument, coding and sampling but are limited to the instrument and sampling in a questionnaire. The overall reliability of an interview is quite limited when compared to using a questionnaire, as it is more difficult to ensure reliability because of the deliberate strategy of treating each participant as a potentially unique respondent. Gillham (2000) also claims that the main disadvantage of using an interview as a research tool is the time factor. It requires a lot of time to develop and pilot the interview, set up and travel to the interview location, transcribe and analyse the information.

Semi-structured interviews, perhaps the most commonly used interview technique in qualitative social research were conducted in the Phase 2 of this study with a fairly open framework which allowed for focused, conversational, two-way communication. They can be used both to give and receive information. Unlike the structured questionnaire or interview framework, where detailed questions are formulated ahead of time, the semi structured interviewing started with more general questions or topics. Relevant topics were initially identified and the possible relationship between these topics and the issues such as availability, expense, effectiveness become the basis for more specific questions which did not need to be prepared in advance. Not all questions were designed and phrased ahead of time, allowing both the interviewer and the person being interviewed the flexibility to probe for details or discuss issues.

3.4.2 Sample Selection – Stratified Randomly Selected

Since no identity was required for returning the survey questionnaires in the Phase 1 of the study, there was no information available on which principals had answered the survey questionnaires. Furthermore, there was no particular correlation shown for those who had returned the questionnaires to the specific school characteristics. So, it

was impossible to relate the sample selection for interview to the survey result.

'*Estimating the number of participants in a study required to reach saturation depends on a number of factors, including the quality of data, the scope of the study, the nature of the topic, the amount of useful information obtained from each participant, the number of interviews per participants, and the qualitative method and study design used.*' (Morse, 2000, p.3). After serious consideration of these factors and in order to avoid any bias, it was decided to select interviewees for this phase of the study by stratified random selection from all 539 primary schools. A ratio of one school for every 50 schools was used to decide on the number of individual interviews. Attention was paid to ensure that the respondents were fairly representative of different type of schools. In Hong Kong, there are 3 different types of funding scheme from the Government for schools (EDB, 2008). The first is the Government school which is totally funded and managed by the Government. The second is the Aided school, which although also fully aided by the Government, is managed by non-profit-making sponsoring bodies under the Codes of Aid. The last one is the Direct Subsidy School. This type of school receives financial assistance instead of full sponsorship from the Government and can be run in private school mode.

According to the numbers of the different funding type of schools in the whole population, one principal from each of the Government and Direct Subsidy schools, and 10 principals from the Aided school were selected. Consent for interviews was obtained by initial telephone conversation with the selected potential interviewees. As a result, 12 interviews were conducted in total.

	Number of schools	Number of schools selected for interview
Government school	36	1
Aided school	484	10
Direct Subsidy school	19	1
Total	**539**	**12**

(Table 3.2) Number of Schools selected for interview

3.4.3 Semi-Structured Interview Schedule

As mentioned above, some of the issues included in the research questions were

further explored in the interview schedule for the purpose of cross validation and elicitation of more contextual data. These issues were: the view and feelings of principals of primary schools towards the ITEd Strategy, the process of the implementation of the ITEd Strategy in primary schools and the implementation outcomes of the Strategy. The interview method was used because it yielded more enriching and stimulating contextual data which was crucial to the understanding of these issues.

The interview started with a brief introduction to the purpose of the study, an assurance of the confidentiality of the data and a request for permission to take notes and record the interview process. The interview schedule was firstly developed in English. For the details of this version, please refer to *Appendix 6*. The interview was conducted in spoken Cantonese - the dialect in Hong Kong and the mother tongue of both the interviewer and the interviewees, and was then translated into the written Traditional Chinese version. For the details of this version, please refer to *Appendix 7*.

In research interviews, it is necessary that the interviewer conducts the interview with total objectivity, so that respondents are not influenced by any outside source in their responses. This can be achieved by asking all interviewees the same questions and instructing all interviewers to report the facts without adding any personal opinions. As a result, interviewer bias and inconsistencies in conducting interviews are reduced.

Nevertheless, different interviewers might still be inconsistent in the way they ask questions and interpret the meaning of the answers. Fortunately, all the interviews in this study were conducted by the author himself. Moreover, all the interviews were taped, so that the possibility of misunderstanding, interviewer bias, and random errors was minimized.

3.4.4 Instruments

A notebook was used to make notes and a digital voice recorder was used for recording the interview.

3.4.5 Data Analysis

Data analysis is the process of systematically collecting and synthesizing all the data in a qualitative study. It involves organizing data into manageable units, synthesizing

them, recognizing patterns, and disseminating the information (Bogdan and Biklen, 1992, p.153). What is exactly involved in data analysis is sorting data into coded sets, recognizing sub-sets and then sorting the data under the various topics. The major codes provide general categories and the '*sub-codes break the major codes into smaller categories*' (Bogdan and Biklen, 1992, p.177). Patton (2002) suggests that coming up with these topics is like constructing an index for a book or labels for a filing system. He suggests the researcher look at what is there and give it a name or a label. The challenge is to ensure that the categories are internally homogeneous and externally heterogeneous. This means that everything in one category must hold together in some meaningful way and that the differences between categories need to be bold and clear. One of the guidelines for good qualitative research analysis is that there must be a category for every data segment. In other words, when the process of sorting all data into the different labels is complete, there should be nothing left.

Basically every utterance of the interviews was recorded on the paper. The scripts were broken up, question by question to facilitate analysis. Each script and each question was gone through and the similarities and dissimilarities were noted down. Common themes were identified and categories were devised. The data was coded and put into matrices for display.

Tool for Analysis

This analysis can be done manually or with the computer. Computer-aided qualitative data analysis allows for easy coding and retrieval of data, but it requires time to determine which programmes best suit the objectives and how much time is required to learn the packages. There is a range of functions obtainable with a variety of programmes, such as simple text retrieval (with GoFer), enhanced text retrieval (Sonar), coding and sorting (Ethnograph), and coding, sorting and linking (NUDIST, Atlas, Winmax). With respect to the size and number of the interviews, the funds and time available, and the inclination and expertise of the researcher (Basit, 2003), the use of a manual method to code data in this study was adopted.

3.5 Accessibility Considerations of the Research

The contact details of all 539 primary schools in Hong Kong were found in the HKSAR web site. According to the law of Hong Kong, this information can be used for non-commercial purposes (OFTA, 2007).

In the Phase One of the study, using Email to send a message to request the

respondent to fill-in a web-based survey form was considered. However, it was felt that this might produce a biased result, as some of the respondents might seldom access the Email system. Therefore, the questionnaires were faxed to the schools automatically by the software WinFax-Pro.

In Phase Two of the study, 12 interviewees were selected randomly according to the proportion of the funding type of primary school in Hong Kong. This interviewee selection process was intended to ensure that a broad range of different schools was represented. The interviewees were contacted via phone before the interview and they were informed about the general purpose of the study, the format of the interview, and the topics that the questions would cover.

3.6 Ethical Considerations of the Research

Research ethics involves the application of fundamental ethical principles to a variety of topics involving scientific research. According to Cohen et al. (2000) and Busher (2003), ethical issues can arise at any stage of a research project:

- *The nature of the project itself*
- *The context of the research*
- *Procedures adopted*
- *Methods of data collection*
- *Nature of the participants*
- *The type of data collected*
- *What is done with the data and how it is disseminated*

Given the importance of ethics for the conduct of research, many different professional associations, government agencies, and universities have adopted specific codes, rules, and policies relating to research ethics. For example, the Economic and Social Research Council (ESRC) has announced a new Research Ethics Framework (REF) for social science research (ESRC, 2005). The dignity, rights and welfare of research participants are core criteria. The Framework took formal effect from 1 January 2006. In this REF, there are six key principles of ethical considerations which are expected to be addressed whenever applicable, in order to sustain and encourage good ethical practice in UK social science (ESRC, 2005, p.1). They are:

- *Research should be designed, reviewed and undertaken to ensure integrity and quality*
- *Research staff and subjects must be informed fully about the purpose, methods*

and intended possible uses of the research, what their participation in the research entails and what risks, if any, are involved. Some variation is allowed in very specific and exceptional research contexts for which detailed guidance is provided in the policy guidelines

- *The confidentiality of information supplied by research subjects and the anonymity of respondents must be respected*
- *Research participants must participate in a voluntary way, free from any coercion*
- *Harm to research participants must be avoided*
- *The independence of research must be clear, and any conflicts of interest or partiality must be explicit*

Honesty and transparency are vitally important in terms of conducting the study successfully. So, besides the REF suggested by the ESRC, the University of Leicester's Research Ethics Code of Practice (University of Leicester, 2008) was also consulted by the author. This study was an EdD thesis and was independent of other research. The author is an independent researcher whose position in the research was that of complete transparency with respect to ethical decisions and issues. The study was designed, reviewed and undertaken to ensure integrity and quality in all the stages of the study. In this study, all participants were made aware of the process in which they were to be engaged, including why their participation was necessary, how it was to be used and to whom it would be reported (BERA, 2004, p.6). The respondents were free to become involved in the research and had the right to withdraw from the research for any or no reason, and at any time. To ensure the principals rather than any other individual received the survey questionnaires, they were faxed to the personal fax machine of the principals. However, it could not be guaranteed that it was the principals rather than any other persons who filled-in and replied to the questionnaires. The replies of the respondents for both survey and interview were kept anonymous and secret and only summarized statistics were publicised. To maintain the confidentially of the research, the questionnaires were sent directly to the fax machine of the author. All the returned questionnaires, and notes and tapes for the interviews were physically locked away. The electronic data and information related to the research were also secured within a stand-alone computer. No harm would be caused to the participants of this study.

3.7 Reliability Considerations of the Research

'Reliability' is an important consideration in educational research but what does it really mean? In fact, the word 'reliable' in everyday language might provide a hint. For instance, people often speak about a machine as reliable: 'I have a reliable car.' Or, news people talk about a 'usually reliable source'. In both cases, the word reliable usually means 'dependable' or 'trustworthy'. In research, the term 'reliable' is very important and also means dependable in a general sense, although that's not a precise enough definition.

Hammersley (1987, p.73) claims that there is no widely accepted definition of reliability. Despite this claim, there is a wide support for the view that reliability relates to the probability that repeating a research procedure or method would produce identical or similar results (Bush, 2003). It provides a degree of confidence that replicating the process would ensure consistency. These notions underpin definitions of this concept:

> *In research, the term reliability means 'repeatability' or 'consistency'. A measure is considered reliable if it would give us the same result over and over again (Trochim and Donnelly, 2007, p.75).*

> *[Reliability demonstrates] that the operations of a study – such as the data collection procedures – can be repeated, with the same results (Yin, 1994a, p.144).*

> *Reliability is the extent to which a test or procedure produces similar results under constant conditions on all occasions… A factual question which may produce one type of answer on one occasion but a different answer on another is… unreliable (Bell, 1987, p.50-51).*

Reliability of the Phase One of the Study

The survey approach which aims to collect a substantial amount of data about the phenomenon under investigation was adopted in the Phase One. A survey by means of questionnaires, a structured procedure for questioning respondents, was distributed to the respondents. One of the main ways of assessing reliability is through the 'test-retest' procedure. A reliable instrument should give more or less the same results each time it is used with the same person or group. '*When tests are developed, they are typically tested for reliability by giving them to a group of people then calling*

back those same people a week later to take the test again' (Bernard, 2000, p.49). Before the questionnaire for this study was finalized, it was given to a pilot group of 5 principals of secondary schools to test it. Minor comments were received and the questionnaire was amended accordingly. This revised questionnaire was then given to the same group of people a week later to re-test it. Direct questioning of respondents of the pilot group was also made, to see if personal responses matched with their previous answers. More or less the same results were collected at both times for this pilot test. Furthermore, the questionnaire was a self-administered instrument for the respondents to answer, no personal influences or interpretation from the researcher or interviewer will be varied for different respondents. By doing this, it is possible to ensure the study is replicable, can be generalised, and provide high reliability.

Reliability of the Phase Two of the Study

The interview approach which aims to collect in-depth data about the phenomenon under investigation was adopted in the Phase Two. Fowler (1993) emphasises the need to ensure that all interviewees are asked the same questions in the same way, if the procedure is to be reliable. In this study, the interviewer and the researcher are the same person, so the process of different interviews was carried out in the same way to a certain extent. Reliability depends on a highly structured instrument as well but a semi-structured interview approach was used in this study, so the reliability of the findings may be compromised. In practice, unstructured or semi-structured interviews are often used by interpretive researchers and assume greater diversity in both the design and use of the research instrument and in the nature of responses from participants. This may limit the scope for reliability while enhancing validity. In fact, Kitwood (1977) and Cohen and Manion (1994) have expressed reservations about an over-emphasis on reliability for interviews because this may have implication for validity.

3.8 Validity Considerations of the Research

A 'reliable' method or instrument gives consistent results in different applications. Consistency, however, '*says nothing about being right or wrong*' (Kelly, 1996, p.43). The 'rightness' or 'truth value' of research is an issue of 'validity'. Validity is always subject to human judgment: it asks the question, '*Does this device measure what it is said to measure*?' (Westmeyer, 1981, p.42). Validity is the extent to which a research fact or finding is what it claimed to be. Winter (2000) has reviewed a selection of the range of definitions given by leading authors about validity and he found two common strands beginning to emerge: firstly, whether the means of measurement are

accurate. Secondly, whether they are actually measuring what they are intended to measure. The following definitions capture the main features of validity:

> *Validity… tells us whether an item measures or describes what it is supposed to measure or describe. If an item is unreliable, then it must also lack validity, but a reliable item is not necessarily also valid. It could produce the same or similar responses on all occasions, but not be measuring what it is supposed to measure (Bell, 1987, p.51).*

> *Validity is the extent to which an indicator is a measure of what the researcher wishes to measure (Sapsford and Evans, 1984, p.259)*

Several different types of validity have been identified by writers on research methods in education. The main distinction is between internal and external validity. '*Internal validity is concerned with the relationships between cause and effect, and external validity is concerned with the extent to which a cause-and-effect relationship can be generalized to other contexts*' (Bassey, 1999, p.75).

Internal validity relates to the extent that research findings accurately represent the phenomenon under investigation, as the following definitions suggest:

> *Establishing a casual relationship, whereby certain conditions are shown to lead to other conditions. (Yin, 1994a, p.143)*

> *How correctly the researcher portrays the phenomenon it is supposed to portray. Brock-Utne, 1996, p.615)*

> *The degree to which findings correctly map the phenomenon in question. (Denzin and Lincoln, 1998, p.186)*

External validity relates to the extent that findings may be generalised to the wider population which the sample represents, or to other similar settings. The following definitions reflect this emphasis:

> *The degree to which findings can be generalised to other settings similar to the one in which the study occurred. (Denzin and Lincoln, 1998, p.186)*

> *External validity refers to the extent to which findings from research can be usefully*

> *generalised. In positivist research traditions, and especially in social survey analysis, this problem has been largely in terms of sampling strategies in order to ensure that the people studied are representative of the wider population to which generalisations are desired. (Brock-Utne, 1996, p.617)*

Validity of the Phase One of the Study

To improve the validity of the Phase One of the study, a relevant literature review was completed to provide a foundation baseline. A few selected samples were interviewed as well before the survey, in order not to miss any important point. A pre-test and pilot survey was carried out to test the instrument. A lot of data or evidence could be found and plenty of qualitative and quantitative information could then be collected from these sources. By doing all of these, it was envisaged that the internal validity of the study would not be a problem. The largest sample size, i.e. the population was then selected for the survey to improve the accuracy of the study, and to guarantee the external validity. As a result, the validity of the recommended strategy should not be in doubt. It should be possible to use accurate instrument to measure what is intended to measure and can be generalized to the whole population.

Validity of the Phase Two of the Study

The main potential source of invalidity in interviews is bias. '*The sources of bias are the characteristics of the interviewer, the characteristics of the respondent, and the substantive content of the questions*' (Cohen and Manion, 1994, p.282). Threats to the validity of the claims exist at each of the gaps between the interviewee's response and the eventual conclusions. Dick (1999) has mentioned some of these threats:

- *Interviewees may misperceive or selectively perceive their situation*
- *Interviewees may not have stored in memory all of what they initially perceived*
- *Interviewees may no longer be conscious of what they originally remembered*
- *Interviewees may be reluctant to report all that they recall for whatever reason*
- *Interviewees may not report all that they are able and willing to*
- *Interviewers may not hear or understand it well*
- *Interviewers may not record it accurately*
- *Interviewers may misinterpret it*
- *Interviewers may be mistaken about the implications and conclusions*

Bearing these potential biases in mind, a pilot process of interviewing two secondary school principals was carried out to test the interview questions and process. Quality rapport was established between the interviewees and the researcher during the actual interview in this study. Their trust was important so that they were willing to provide

the accurate information. For some uncertain conversations, I have re-phrased what I think the interviewees said in my own words during the interview, in such a way that it is easy for them to correct if I misconstrued their response. The interviews were recorded for later use in the data analysis stage, in order to reflect the reality. Lastly, since the research collected data by different methods, triangulation of information could be carried out to improve the validity of the study.

3.9 The Implementation of the Research

The process of the implementation of the research and the profile of the respondents will be reported in this section.

3.9.1 Phase One of the Research - Survey

The survey was conducted in October 2007 by means of self-administered and structured questionnaires. The target respondents were principals of primary schools in Hong Kong. A total of 539 questionnaires were faxed to them. Of these, a total of 6 failed to reach the target samples. This made a total of 533 successful questionnaires sent.

A week was given to the target respondents to fill in the questionnaire. After this period, 73 completed questionnaires were received which represented a response rate of 13.7% (73 / 533).

In order to boost the response rate, a reminder was faxed to all schools on 8 October 2007 to remind those who had not yet returned the questionnaires. Finally, a total of 96 questionnaires were received, an overall response rate of 18.0% (96 / 533). All of the data collected were inputted into Statistical Package for the Social Sciences (SPSS) for analysis. The pseudonym SR-1 to SR-96 is used to indicate the 96 respondents of the survey.

By using the population instead of particular sampling selection as the targeted respondents, all principals of the primary schools had an equal opportunity to express their opinions. So, there should not be any bias when considering the profile of the respondents who had responded. The response rate is also acceptable and it is already higher than was expected in the research methodology design stage (refer to Section 3.3.3). Therefore, 18.0% of total primary school population should be able to represent and provide sufficient data to answer the research questions.

For the Questions (1) to (4) of the first part (background information) of the questionnaire, the statistics of the respondents are summarised in Table 3.3a, Table 3.3b, Table 3.3c, Table 3.3d and Table 3.3e.

	Number of respondents	Percentage of respondents
Government school	7	7.3%
Aided school	85	88.5%
Direct Subsidy school	4	4.2%

(Table 3.3a) Questionnaires returned – by type of school

According to the information provided by the EMB in its website, there were 36 government primary schools, 484 aided primary schools and 19 direct subsidy schools in Hong Kong. So, the response rate of these 3 types of schools was respectively 19.4% (7/36), 17.6% (85/484) and 21.1% (4/19).

	Number of respondents	Percentage of respondents
0-10 years	17	17.7%
11-20 years	14	14.5%
21-30 years	9	9.4%
31-40 years	11	11.5%
41-50 years	26	27.1%
51-60 years	9	9.4%
61-70 years	3	3.1%
71-80 years	3	3.1%
81-90 years	4	4.2%

(Table 3.3b) Questionnaires returned – by age of school

As to the age of the schools, the youngest one was 5 years old, whereas the oldest was 88 years. The average age of schools was 35.5 years and the standard deviation was 21.7 years. According to EMB, the size of the newer schools is becoming larger compared with older schools. Flexibility of the use of the classrooms was also

considered more seriously when building such new schools (Singtao, 2009).

	Number of respondents	Percentage of respondents
1-10	4	4.2%
11-20	10	10.4%
21-30	16	16.7%
31-40	19	19.8%
41-50	28	29.2%
51-60	17	17.7%
61-70	2	2.0%

(Table 3.3c) Questionnaires returned – by size of school (no. of teachers)

As to the number of teachers in the schools, the maximum number was 70 teachers whereas the minimum was only 8 teachers. The average number of teachers in schools was 37.3 and the standard deviation was 14.1.

	Number of respondents	Percentage of respondents
1-100	2	2.0%
101-200	10	10.4%
201-300	6	6.3%
301-400	6	6.3%
401-500	11	11.5%
501-600	10	10.4%
601-700	5	5.2%
701-800	10	10.4%
801-900	13	13.5%
901-1000	11	11.5%
1000-1100	12	12.5%

(Table 3.3d) Questionnaires returned – by size of school (no. of students)

For the number of students in the schools, the maximum was 1076 students whereas the minimum was only 76 students. The average number of students in the schools was 631.7 and the standard deviation was 299.5.

	Number of respondents	Percentage of respondents
0-5 years	9	9.4%
6-10 years	60	62.5%
11-15 years	19	19.8%
16-20 years	8	8.3%

(Table 3.3e) Questionnaires returned – by years of the school adopted IT in Education

In relation to the number of years the schools had adopted IT for use in education, the longest period was 20 years whereas the shortest was only 4 years. The average years the schools had adopted IT in education was 10.0 and the standard deviation was 3.2.

3.9.2 Phase Two of the Research - Semi-structured Interview

The semi-structured interviews were conducted between May 2008 and July 2008. The target respondents were principals of 12 primary schools in Hong Kong. They were selected according to the stratified sampling method suggested in Section 3.4.2. The representation of these 12 principals is presented in Table 3.3f.

Pseudonym	**Type of School**	**Age of School**
IR-1	Aided School	44
IR-2	Aided School	18
IR-3	Aided School	11
IR-4	Aided School	7
IR-5	Aided School	9
IR-6	Aided School	28
IR-7	Aided School	18

IR-8	Aided School	16
IR-9	Aided School	26
IR-10	Aided School	12
IR-11	Government School	28
IR-12	Direct Subsidy School	9

(Table 3.3f) Selected Sample for Semi-structured Interview

Each interview lasted between 30 to 45 minutes. During the course of the interview, notes were taken together with the recording. The interviews were conducted in spoken Cantonese, the mother tongue of both the interviewer and the interviewees. Notes were taken in written Traditional Chinese Characters on the note sheets to facilitate analysis of the data. Shortly after each interview, usually within a few days, the scripts were tidied up with the aid of the recording in written Traditional Chinese Characters, to make sure that no important information went missing in the note-taking stage. The scripts were then validated by the respondents. Afterwards, they were translated to English scripts for analysis by the author.

The information provided by the interviewees was then interpreted and related to the main objectives of the study. In this analysis phase, the information from the 12 interviews was extracted, re-organized, and interpreted in meaningful ways. This entailed drawing connections between different ideas or processes that were mentioned in the interviews, even if these connections themselves were not explicitly noted by the interviewees. The patterns of associations between variables were also identified. Important texts were extracted for later direct quotation use as well. A presentation and discussion of the findings will follow in the next two chapters.

Chapter 4 Research Findings

The purpose of the study was to investigate to what extent Principals of Primary schools in Hong Kong perceived that the ITEd Strategy had been implemented successfully to achieve a paradigm shift from a teacher to a more student centred approach to learning and the factors which had affected the implementation. Evidence was sought from primary school principals using a self-administered survey questionnaire and semi-structured interviews. Findings for research question one report on the extent to which the visions had been met, major applications of IT in schools, changes in the teaching approach and the effect on students' learning. Findings for research question two follow on the contribution of the policy's central components, notably the provision of an IT infrastructure, teachers' professional development, curriculum and resource support and the support of local partnerships to its success. Findings for research question 3 examine the relationship between school characteristics and the intended paradigm shift. Findings for research question 4 report on factors which have affected the implementation of the strategy. The section includes a consideration of the principals' support for the policy objectives, the process of policy implementation and recommendations to support the future development of IT in Hong Kong primary schools. The chapter concludes with a brief summary of findings.

4.1 Research Question One: To What Extent do Primary School Principals Believe the Visions of the IT Strategy Have Been Achieved?

This section starts with a broad overview of the principals' perceptions of the extent to which a paradigm shift in teaching and learning had taken place and the extent to which the four main visions of the policy had been achieved. This is followed by a more in-depth consideration of the impact of the policy on teaching in the classroom and student learning. Information gained from the survey is supplemented by evidence derived from interviews with the principals.

4.1.1 The Achievement of a Paradigm Shift in Teaching and Learning

The principals were asked whether they agreed with the statement that '*The ITEd Strategy has been implemented successfully in their schools to achieve its desired outcomes of a paradigm shift from a largely textbook-based teacher-oriented approach to a more interactive and learner-centred approach'* in Question (15) of the

questionnaire and Question (1) of the interview schedule.

Table 4.1 summarises the responses. Whilst only 28.1% of the principals agreed with the statement, a significant majority (61.5%) disagreed with the statement and 10.4% didn't know.

	Percentage of respondents
Agree	28.1%
Disagree	61.5%
Don't know	10.4%

(Table 4.1) Agreement of the respondents about paradigm shift

The null hypothesis (H_0) '*The ITEd Strategy has been implemented successfully in primary schools to achieve its desired outcomes of a paradigm shift from a largely textbook-based teacher-oriented approach to a more interactive and learner-centred approach'* was rejected at the 5% significance level ($p<0.05$). It implies that there was sufficient evidence at a 95% confidence level against the null hypothesis in favour of the alternative hypothesis that '*The ITEd Strategy has not been implemented successfully in primary schools to achieve its desired outcomes of a paradigm shift from a largely textbook-based teacher-oriented approach to a more interactive and learner-centred approach'.*

4.1.2 The Achievement of the Visions of the ITEd Strategy

The principals were asked in Question (5) of the questionnaire and Question (2) of the interview schedule to what extent they perceived that the original visions of the ITEd Strategy had been achieved. Table 4.2 summarises their responses. Generally speaking, more principals disagreed with the view that the visions of the ITEd Strategy had been achieved in their schools compared to those who supported the statement.

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
(a) the respondent's school has turned into a dynamic and innovative institution where students become more motivated, inquisitive and creative learners	4.2%	16.7%	47.9%	20.8%	10.4%
(b) the respondent's students has linked up with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global outlook	7.3%	23.9%	30.2%	29.2%	9.4%
(c) the respondent's students has developed capabilities to process information effectively and efficiently	7.3%	22.9%	35.4%	14.6%	19.8%
(d) the respondent's students has developed the attitude and capability for independent life-long learning	4.2%	19.8%	27.1%	28.1%	20.8%

(Table 4.2) Statistics of respondents agreed with the visions of the ITEd Strategy

Vision (a) – Turned into a Dynamic and Innovative Institution

The Government envisaged that IT had the potential to make teaching more innovative and interactive and produce learners who were more highly motivated, inquisitive and creative. However, the principals did not agree that this had happened. From the survey, it was found that only 20.9% of the principals agreed or strongly agreed with this statement; on the other hand, 31.2% disagreed or strongly disagreed and 47.9% neither agreed nor disagreed. Of the four visions, this was perceived to be the least successful.

Vision (b) – Linked with the Vast Network World

The Government envisaged that IT had the potential to improve student access to a wider range of learning resources. This was perceived to be the most successful of the four visions. However, it was found that only 31.2% agreed or strongly agreed that this had happened. On the other hand, 38.6% disagreed or strongly disagreed with this view and 30.2% neither agreed nor disagreed.

Vision (c) – Developed Students' Capabilities to Process Information

Faced with an ever increasing supply of information accessible through IT, the Government believed that students should be taught to process information; this involves the retrieval, analysis, storage, management and presentation of information. However, only 30.2% agreed or strongly agreed that their students had developed

capabilities to process information effectively and efficiently; on the other hand, 34.4% disagreed or strongly disagreed, 35.4% neither agreed nor disagreed adopted.

Vision (d) – Developed an Attitude and Capability for Life-long Learning

The Government believed that IT had the potential to motivate and empower students to learn at their own pace and help them develop habits of life-long learning. In practice, there was some way to go before this could be perceived to have been successful. Only 24.0% of the principals agreed or strongly agreed that this had happened with the statement and 27.1% neither agreed nor disagreed.

4.1.3 The Use of IT in Hong Kong Primary Schools

To investigate the broad use of IT in the primary schools, the principals were allowed to select up to 3 choices in Question (9) of the questionnaire. They selected one, two or all three choices.

	Number of respondents	Percentage of respondents
School Administration and Management System (SAMS)	65	67.7%
Teaching and learning	63	65.6%
Courseware development	26	27.1%
Internal communication	25	26.0%
School-based curriculum development	21	21.9%
External communication	11	11.5%
School extra-curricular activities	11	11.5%
Resource management	6	6.3%
Others	4	4.2%

(Table 4.3) The major purposes for the school's use of IT

The percentage in the above table is calculated by dividing the number of respondents selecting a particular choice by the total number of respondents (96).

Of the various uses to which IT was put, two stood out as being especially significant. Teaching and Learning was identified as the second most important use suggesting that IT had been adopted for teaching purposes in nearly two thirds of primary schools in the sample. More important however, was the use of IT for administrative purposes (67.7%). This was because the School Administration and Management System

(SAMS) had been developed and operated by the Education Department (ED) for communication with schools. However, '*courseware development*' and '*school-based curriculum development*' only accounted for 27.1% and 21.9% respectively. Little progress in schools had been made to develop school-based IT resources.

4.1.4 Changes in Teaching Approach

As part of the intended paradigm shift in teaching and learning centred involving the use of IT, the intention of the government was that some significant changes of practice would occur in the classroom. This section will begin with a consideration of the principals' perceptions of changes which had occurred in the teaching approach as revealed in the survey questionnaire. As this method could provide only broad generalisations, this will be supplemented by evidence from the interviews with the principals which revealed their own and their perceptions of teachers' beliefs about changes in teaching and learning.

Concerning their awareness of changes in the teaching approach after using IT, the principals were allowed to select up to 3 choices in Question (10) of the questionnaire. They selected one, two or all three choices.

	Number of respondents	Percentage of respondents
From teacher-oriented to student-oriented	36	37.5%
From knowledge-based to "learning to learn"	10	10.4%
From uni-directional to bi-directional	53	55.2%
From examination-oriented to project-oriented	9	9.4%
From textbook to open-knowledge oriented	42	43.8%
No change	39	40.6%
Others	0	0.0%

(Table 4.4) The changes in the teaching approach of those teachers after using IT

The percentage in the above table is calculated by dividing the number of respondents selecting a particular choice by the total number of respondents (96).

What is immediately apparent is that just over half (55.2%) of the principals perceived that teaching had become more interactive (from uni-directional to bi-directional) which had been one of the original aims of the policy. There was also perceived to be a significant movement away from the use of textbooks to resources produced by the teacher (43.8%). Some aspects however had apparently proved much more resistant to

change. Very little progress had been made in helping the students to 'learn how to learn' (10.4%) which is an important aspect of students being responsible for their own learning and becoming more autonomous. Also, perhaps the competitive summative examinations system continued to impact on teaching with 'teaching to the test' continuing to be prominent. Nearly 90% of principals perceived that preparation for examinations was still a paramount consideration.

4.1.5 Effect of the ITEd Strategy on Students' Learning

This section will explore principals' views about the way in which IT was being used to support learning, the impact of the IT strategy on students' understanding and outcomes.

Concerning the impact of the policy on students' learning, the respondents had the following feelings expressed in Question (11) of the questionnaire.

	Percentage of respondents
Learn about IT	49.0%
Learn from IT	4.2%
Learn with IT	43.7%
Manage learning with IT	3.1%

(Table 4.5) The students' dominant view about the use of IT to support learning

Almost half of the principals (49.0%) reported that they perceived that their students held a view of IT in education as '*learning about IT*'. 43.7% of the respondents claimed that their students could use IT to assist their learning in other subjects in schools. Very few of the principals reported that their students '*learn from IT*' or '*manage learning with IT*, and this only accounted for 4.2% and 3.1% respectively. It can be argued that the extent to which primary students were applying IT in their learning was still only at the beginning stage and they did not fully explore the capability of IT in their studies.

The effect of using IT on students' understanding and the test and examination results was also explored in the study in Question (12) of the questionnaire.

	Much Improved	Improved	No change	Deteriorated	Much Deteriorated
Students' understanding of the teaching materials	5.2%	32.3%	50.0%	11.5%	1.0%
Students' test and examination results	0.0%	14.6%	81.3%	3.1%	1.0%

(Table 4.6) Learning outcomes after using IT in Education

From the evidence, it was found that 37.5% of the respondents claimed that their students' understanding of the teaching material had been improved or much improved after using IT in education. On the other hand, 12.5% of the respondents claimed that it had deteriorated or much deteriorated. Half (50.0%) of the respondents claimed that there was no change in that aspect.

Concerning the students' test and examination results, no respondent reported '*much improved*'. There were 14.6% of the respondents who claimed that it had improved. On the other hand, only 4.1% respondents claimed that the students' results had been negatively affected; over 80% of the respondents claimed that there had been no observable change.

More Pro-Active learners

Some principals explained that access to the internet had resulted in students who were traditionally passive learners being more pro-active. As IR-4 reported:

> *'Students in Hong Kong are more passive compared to foreign students. Until we started using email for communication, they very rarely came to see the teachers. But after our teachers offered the email, they certainly did that.'.*

This view was endorsed by IR-1:

> *'I have noticed that some upper form students who are shy and don't talk much in classes have changed after exploring the Internet. In fact, most of the typical students of Chinese culture are passive learners. However, they are more willing to speak (write) their ideas to teachers or other classmates by using communication tools on the Internet. Sometimes, their ideas are quite innovative.'.*

Respondent IR-10 also claimed that some progress towards students being more in

control of their learning, working at their own pace, when using IT had been made in his school. He claimed that:

> *'On the student side, they can pace themselves using the software and decide on the course of action to take. Hence, they can have more participation and more thinking during the study.'.*

Learning to learn

Respondent IR-4 noted that partial progress had been achieved with some students being able to access more information in preparation for their lessons.

> *'The students have had the chance to browse the Internet to access more information, to read the subject and the links. So when they come to the classes, they are more prepared and they can ask more questions to make the classroom atmosphere more lively.'.*

However, this view was tempered by that of respondent IR-1 who believed that there was too much copying for their project work rather than actual processing of information.

> *'Sometimes, the students just download all materials from the Internet by matching some particular keywords. Some of the content in their project work is just duplication of content from the Internet'.*

Some principals argued that the effect of IT on learning had been essentially superficial:

> *'Students need deeper processing in learning, reading skills to dig into issues, analytical power and a good power of expression.*

> *'It seems that the students can understand what was presented by using IT technology at that moment. However, most of them forget everything when they come back to school in the next day.'. (IR-5)*

4.2 Research Question Two: How Far have the Policy's Central Components Contributed to its Success?

The principals were asked for their views on the contribution of the central components of the ITEd Strategy to its success in their school in Question (6) of the questionnaire and Question (3) of the interview. These components were: the provision of adequate IT facilities; the enablement and professional development of classroom teachers; changes in the curriculum and resource provision to support the integration of IT; the creation of local partnerships.

Table 4.7 summarises the responses. Generally speaking, more respondents disagreed with the contribution of the central components of the ITEd Strategy to its success in their schools compared to those who agreed.

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
(a) adequate IT facilities, including network facilities for students and teachers to enable them to assess information has been provided	6.3%	12.5%	37.5%	28.1%	15.6%
(b) key players in the school system have been encouraged to take up the challenges of their respective new roles	5.2%	16.7%	36.4%	30.2%	11.5%
(c) necessary curriculum and resource support for the integration of IT into the school education has been meaningfully provided	2.1%	20.8%	29.2%	35.4%	12.5%
(d) the emergence of a community-wide environment conducive to the culture change has been fostered	4.2%	22.9%	33.3%	28.1%	11.5%

(Table 4.7) Statistics of respondents agreed with the contribution of the central components

4.2.1 Contribution of Central Component (a) – IT Facilities

The first key component of the ITEd Strategy referred to the availability of hardware and software which was intended to increase the level of IT access and connectivity in the schools. In this aspect, the HKSAR government did not fix the amount of hardware and internet access for the schools, but rather intended that the students should have a 'sufficient level' of hardware and access to the internet. However, from the survey, it appeared that only 18.8% of the respondents agreed or strongly agreed that adequate IT facilities, including network facilities for students and teachers to enable them to assess information had been provided in the schools. On the other hand, 43.7% of the respondents disagreed or strongly disagreed and 37.5% of the

respondents neither agreed nor disagreed.

Information available from the questionnaire was supplemented by interviews with the principals.

Concerns about Funding

There were particular concerns about the amount of money available to provide an adequate IT infrastructure in schools which included hardware, software and technical support. Respondent IR-11 claimed that he could only:

> *'support the objectives of the policy if sufficient resources are provided to schools, teachers, parents and students'.*

Respondents SR-26 and SR-57 stated that the reason for the insufficient or outdated equipment was insufficient recurrent funding.

Because of the shortage of funds, those schools which were unable to supplement the government allocation were adversely affected. According to respondent IR-2,

> *'Our school is not a famous school. We do not receive any donation from our alumni, parents and commercial sectors. So, besides the Government funding, we do not have any other resource for the implementation of the policy. In my opinion, the Government should arrange some special assistance for this kind of school.'.*

Numerous respondents expressed their concern that the IT facilities provided by the Government were not only insufficient, but also outdated and sometimes broke down Respondent IR-8 claimed that:

> *'A lot of bulbs of the LCD projectors need replacement simultaneously in these 3 months but we do not have sufficient money in this academic year to replace them. We need to wait for the money in the next academic year.'.*

The limited availability of computers meant that it was difficult for the teachers to engage in interactive and collaborative learning. This view was confirmed by respondent IR-7 who claimed that:

> *'Students can only observe and listen to what the teachers present in the class by using*

the only computer in the classroom. It seems that there is no difference to using overhead transparencies.'.

The same principal was also concerned about the pace of technological change and the extent to which IT equipment rapidly becomes outdated.

Concerns about Technical Support

Another key problem was perceived to be the lack of technical support for the teachers when the IT equipment mal-functioned in the classroom and made some of them reluctant to use the equipment. Respondent IR-5 claimed that:

'Problems always happen when our teachers use the computers for the lessons. This makes the teachers very frustrated to adopt IT in teaching and the teachers need to prepare a contingency plan for the lesson to cater for the malfunction of the equipment.'.

Respondent IR-1 also felt that despite arrangements which had been made by the government, the level of technical support was inadequate:

'Technical support provided by the Government and the IT knowledge of teachers are not sufficient. In fact, technical staff, clerical staff or even housekeeping staff is insufficient in the ITEd Strategy. This money should be spent if a better implementation process is desired.'.

The same respondent cited another incident in which essential IT equipment had been left idle to reflect the seriousness of the lack of technical manpower:

'I remember the computers for our Multimedia Learning Centre (MMLC) were delivered to us after Chinese New Year in a year. At that time, we did not have enough technicians to install them. The unpacked computers were then kept in the room until that summer. That is, a delay of nearly 6 months occurred before the students could actually use them.'. (IR-1)

Respondent IR-12 revealed that the insufficient level of technical support was due to the limited budget.

'We always have problems employing a good and responsible IT technician. Due to the

limited budget, we cannot offer an attractive remuneration package to employ better staff.'.

On the other hand, a few respondents like respondent IR-4 were very supportive of the enhanced IT facilities which had been made available to his school. In an extreme case, respondent SR-59 commented:

'too much hardware has been provided to schools that were not used'.

Concerns about the unequal access of students to IT hardware and software

Not only were some primary schools richer in resources than others, some respondents also expressed their concern about the impact of the financial situation of poorer students on the achievement of the ITEd Strategy. Respondent IR-11 argued that:

'According to the vision, IT in education should benefit all students in Hong Kong. But in our schools, this is still the game of those richer students. Their parents can afford to buy top model computers, join the highest speed internet connection, install the latest software, etc.'.

Respondent IR-1 agreed:

'The policy has not considered that some students do not have Internet connection or even computer at home. We must take this into account when designing our teaching method.'.

It was apparent that those schools which had some students from mainland China were handicapped by the inequitable access to computers. Respondent IR-11 explained that:

'The major students of our school are new immigrants from China. Their families are relatively poor and the problem of the digital divide exists. They do not have sufficient equipment at home even though we encourage them to use information technology to facilitate learning. So, I don't think our school has achieved the outcome of the paradigm shift.'.

Respondent IR-2 suggested that this situation could be tackled by providing government subsidies to poorer students:

'The Government should subsidize poor students directly to buy necessary equipment. Otherwise, these students would be handicapped by the adoption of IT in education.'.

4.2.2 Contribution of Central Component (b) – Teacher Enablement and Professional development

The second component in the ITEd Strategy was teacher enablement. This related to the encouragement and support which teachers were given to adopt a new role as a learning facilitator using the potential of IT to transform learning. However, from the survey, it was found that only 21.9% of the respondents agreed or strongly agreed that the 'key players' in the school system had been encouraged to take up the challenges of their respective new roles. On the other hand, 41.7% of the respondents disagreed or strongly disagreed and 36.4% of the respondents neither agreed nor disagreed.

The government had introduced a professional development programme to support teachers to equip them with the necessary skills for implementing the ITEd Strategy. However, for many principals, the lack of skill on the part of teachers to implement the required changes was closely linked to the inadequacy of professional training. Evidence from the interviews suggested that there were major concerns about its relevance and timing. Respondent IR-7 echoed the views of many:

'The training arranged by the Government is poor.'.

This view was confirmed by Respondent IR-5 who claimed that:

'We've never had any good training. In our school, a lot of the training is done by technical people on the list recommended by the Government.'.

To improve the situation, Respondent IR-6 called for training that was relevant and appropriately timed:

'Our teachers need someone who could give them training on what they want to use. It would preferably have the training scheduled well before their use to let them have enough time to familiarise with it.'.

For many principals the priority was that training may potentially help their teachers to integrate the use of IT into their classroom teaching. Respondent IR-3 identified the

need:

> *'to diffuse IT into daily teaching and learning. More training in this aspect should be provided to them.'.*

A particular criticism was perceived to be the failure of the training provider to adjust the training to the needs of individual teachers. Respondent IR-10 expressed his frustration at the failure of the trainer to move beyond basic technical competence to place more emphasis on using IT to support interactive and collaborative learning.

> *'The tutor knew that we all knew the basics of Excel. But he said he must stick to the syllabus of basic Excel suggested by the Government. We have wasted three hours. The tutor definitely had no concept of applying the use of Excel in teaching. This kind of training is a waste of time.'.*

Endorsing this concern, respondent IR-3 emphasised the need to have trainers with the requisite IT pedagogical knowledge and skills as well as technical skills. He suggested that:

> *'The trainers of such courses should have experience in both technological and educational aspects, instead of as a computer programmer.'.*

According to Respondent IR-12, teachers were also handicapped by the rapid pace of change in the type of software available:

> *'Our teachers seldom adopt IT in teaching. They do not have enough practice to make themselves familiar with the technology. Sometimes, the rapid change of the version of the software makes them even more frustrated.'.*

Respondent IR-3 was concerned that teachers may also be given time to familiarise themselves with the new IT resources. He suggested that teachers

> *'need a lot of time to consolidate the materials to make them useful.'.*

4.2.3 Contribution of Central Component (c) – Curriculum and Resource Support

The third component in the ITEd Strategy was intended to provide curriculum and resource support in order to integrate the use of IT into the curriculum. The EMB aimed to have the teaching of the school curriculum supported through IT, by

providing more resource support to the schools. However, from the survey, it was found that only 22.9% of the respondents agreed or strongly agreed that necessary curriculum and resource support for integration of IT into the school education had been meaningfully provided to the schools. On the other hand, 47.9% of the respondents disagreed or strongly disagreed and 29.2% of the respondents neither agreed nor disagreed.

Some principals were doubtful whether IT could be successfully introduced without a major overhaul of the curriculum. For example, Respondent IR-1 claimed that:

> *'It is difficult to say (whether it has been successful). It is because we are still required to follow the standard curriculum for primary education suggested by the Government. The effectiveness is a doubt if the curriculum cannot be changed.'.*

Others suggested that there was a need to make more effective use of the new equipment by extending the school day. Respondent IR-11 suggested:

> *'School can consider opening its premises after school-hours or during school holidays to let students use the IT facilities. But this involves extra resources which should be provided by the Government.'.*

4.2.4 Contribution of Central Component (d) – Community-wide Environment

The last component in the ITEd Strategy was designed to create and promote a community-wide culture to support the paradigm shift in teaching and learning. The Government expected that the different stakeholder groups in Hong Kong would become actively involved in implementing the strategy. However, from the survey, it appears that only 27.1% of the respondents agreed or strongly agreed that the emergence of a community-wide environment conducive to the desired culture change had been fostered. On the other hand, 39.6% of the respondents disagreed or strongly disagreed and 33.3% of the respondents neither agreed nor disagreed.

Respondent IR-4 shared his view about the reason for the difficulty the Government faced to promote a community-wide culture:

> *'In fact, I'm not sure that the senior management of the Education Bureau have a feeling for how information technology can improve teaching. How then can they create and promote the community-wide culture to support the paradigm shift?'.*

4.3 Research Question Three: To What Extent is the Meeting of Objectives in Individual Schools Related to Specific School Characteristics?

In the survey questionnaire, Questions (1) to (4) in the section on 'Background Information' were used to collect basic facts on the schools. This information was analysed and their relationship to the respondents' claims of whether the paradigm shift had been achieved by the ITEd Strategy in their schools is presented according to the Table 3.1 in the previous Chapter.

In this study, the Pearson's product-moment correlation coefficient of '*type of school*' (Question 1) in relation to the claim of paradigm shift (Question 15) was 0.105. This is an extremely small positive number and it means that there is virtually no relationship existing between these two variables.

For the '*age of school*' (Question 2) in relation to the claim of a paradigm shift (Question 15), they are negatively related and the Pearson's product-moment correlation coefficient was -0.405. This implies that the younger the age of a particular school, the higher the chance of success in implementing the ITEd Strategy in that school.

For the '*size of school*' (Question 3) in relation to the claim of a paradigm shift (Question 15), they are also correlated in a positive direction. The Pearson's product-moment correlation co-efficients for the '*number of teachers*' and '*number of students*' were 0.31 and 0.32 respectively. This implies that the larger the numbers of teachers or students in a particular school, the higher are the chances of success in implementing the ITEd Strategy in that school.

For the '*schools previous IT experience*' (Question 4) in relation to the claim of a paradigm shift (Question 15), they are also positively correlated and the Pearson's product-moment coefficient was 0.34. This implies that if a particular school had a longer experience of applying IT in education, the chance of success in implementing ITEd Strategy in that school was higher.

So, it can be argued that the achievement of a paradigm shift by the ITEd Strategy in the primary schools was correlated with the age, size and previous IT experience of the schools.

4.4 Research Question Four: What other Factors have Helped or Hindered Teachers in Schools to implement the ITEd Strategy?

In addition to the opinions expressed concerning the contribution of central components, other factors that principals perceived had hindered or helped teachers in schools to implement the ITEd Strategy were also investigated. In attempting to identify these factors, this section will examine the principals' support for the key visions, the major reasons why they did and did not implement the policy and their views on the process of the implementation.

4.4.1 To What Extent Did the Principals Support the Key Visions of the ITEd Strategy?

The principals were asked to what extent they supported the key visions of the ITEd Strategy in Question (13) of the questionnaire and Question (4) of the interview schedule.

	Strongly Support	Support	Neither	Not Support	Strongly Not Support
(a) to turn the school into a dynamic and innovative institution where students can become more motivated, inquisitive and creative learners	16.7%	41.6%	19.8%	14.6%	7.3%
(b) to link up the students with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global outlook	26.0%	35.4%	17.7%	14.6%	6.3%
(c) to develop in the students capabilities to process information effectively and efficiently	16.7%	37.5%	26.0%	11.5%	8.3%
(d) to develop in the student the attitude and capability for independent life-long learning	16.7%	39.6%	23.9%	12.5%	7.3%

(Table 4.8) Statistics of the support level of the respondents with the visions for the ITEd Strategy

Table (4.8) summarises the principals' responses. Generally speaking, more than half of the respondents showed support for the key visions of the ITEd Strategy compared to those who did not support them. For each category, just over half the principals surveyed claimed to support the aspirations of the strategy.

Support Level for Vision (a)

It was found that a high proportion (58.3%) of the principals supported or strongly supported a vision of the ITEd Strategy turning their schools into dynamic and innovative institutions where students became more motivated, inquisitive and creative learners. On the other hand, only 21.9% of the principals did not support this view. 19.8% of the principals did not have views on this either way.

Support Level for Vision (b)

Support for vision (b) was even higher. It was found that 61.4% of the principals supported or strongly supported the claim that the ITEd Strategy would enable their students 'to link with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global outlook'. However, only 20.9% of the principals did not support this view and 17.7% of the principals did not have an opinion.

Support Level for Vision (c)

It was found that 54.2% of the principals supported or strongly supported the view that the ITEd Strategy had the potential to develop the ability of their students to process information effectively and efficiently. On the other hand, 19.8% of the principals did not support this contention. 26.0% of the principals did not have any position to this question.

Support Level for Vision (d)

It was found that 56.3% of the principals supported or strongly supported the notion that ITEd Strategy could develop the attitude and capability of their students for independent life-long learning. On the other hand, 19.8% of the principals did not support this idea. 23.9% of the principals did not have any position to this question.

4.4.2 Concerns About the Visions of the ITEd Strategy

Despite the fact that more than half of the principals showed support for the key visions of the ITEd Strategy, in the interviews, some expressed opinions about whether IT was a priority, the use of IT to enhance learning and attitudes to the pedagogical challenge of using IT to enhance learning.

Competing priorities

In view of other competing and for them more important priorities, some respondents queried the urgency of the implementation of the IT policy in school. For example, respondent SR-16 claimed that as a consequence of the falling birth rate in Hong Kong, the need to recruit students was a more pressing concern for his school than introducing IT.

> *'We have a lot to do already. At this moment, the first thing we need to do is to make sure we have recruited sufficient students for primary 1. IT in education is an extremely low priority task in our school.'.*

Another respondent IR-1 pointed out that since the Government had already introduced a lot of different educational reforms, they should state clearly their preferred priority and support the development accordingly with additional money and manpower:

> *'If IT in education is still their concern, much more useful resource should be supplied to the schools. Manpower and money are the most important.'.*

Beliefs about the use of IT to enhance learning

Potential advantages of using IT to enhance learning

Some principals felt that IT had the potential to improve the learning process of the students, notably their understanding of important concepts. For instance, IR-8 claimed that:

> *'Information technology can enable students to grasp concepts which cannot be explained clearly by direct teaching '.*

Although some principals believed that the technology could enable the students to access a wider range of resources, this was dependent on the teachers equipping them with a range of information processing skills so that they could take full advantage of the internet. According to IR-5,

> *'without the supervision of our teachers, the students would find this difficult'.*

This was a view which was shared by IR-9:

'It is useless to give the students a lot of websites to browse in the lesson because they will find it very confusing to choose the most relevant ones to read. The teachers need to give them a lot of help.'.

Concerns about the extent to which the visions of the strategy could be achieved by a reliance on IT alone

Whilst broadly supporting the visions, there appeared to be some concerns about the feasibility of relying on IT alone to spearhead a paradigm shift. Respondent IR-1 was doubtful that IT alone could achieve the desired visions of the strategy, a view which was endorsed by respondent IR-4:

'I don't think IT alone can achieve them. I suppose that this should be the objectives of the whole education, instead of for ITEd Strategy.'. 'More important, it cannot be achieved by the IT itself. All we should do is to change students' mind set, instead of just introducing the technological tools to them. (IR-1)

'Personally, I support the key objectives of the policy but I don't think only information technology can achieve them.'.(IR-4)

Concerns about the appropriate use of IT

Whilst supporting the broad visions, some stressed the importance of knowing when to use IT in teaching. Respondent IR-12 argued that:

'It is not the problem for the key objectives of the ITEd Strategy. However, it is the question of how to use the right technology at the right time in the right aspect of teaching and learning to achieve these objectives. IT is only a tool and teachers can do well without it.'.

Appropriateness of IT for young children

For some principals, the intended paradigm shift in teaching and learning using IT was a very ambitious aim for primary school students. A particular problem was perceived to be the time needed to develop attitudes and skills for independent learning. As respondent IR-1 argued:

'To develop an attitude and capability for independent life-long learning needs a long time.'.

The age profile of students who were too young to exploit the potential of the new technology was another major factor. On occasions, homework was completed by the parents. Respondent IR-6 felt that:

'Most of our primary students are too young so that they are incapable of using the information technology to facilitate their learning. Even though our teachers asked the students to do some of the studying tasks using the Internet, they noticed that the parents of the students did the major work'.

More specifically, respondent IR-2 pointed out some of the pitfalls of over-exposure of young people to IT.

'Before we can achieve effective use of IT in education, there are already a lot of side effects affecting young people. Some of our students are addicted by the computer games. They spend a lot time in meeting net friends although they do not know their real identity. Computer crimes such as infringing of copyright by the students also occurred.'.

Respondent IR-10 suggested that there are a lot of potential side effects of using IT on students which needed to be considered. He queried whether the Government had anticipated these effects seriously when designing the ITEd Strategy. He was concerned about the potential of:

'the deterioration of their writing skill, the bad effect on their eyesight, imagination power, dependency on the computer, organization power, etc.'.

One principal, IR-12 was concerned that not all students were IT literate.

'Some students are strong in using a computer but some are very weak. If we insist on using the computer to teach non-computer subjects, this may cause a great problem to those who are weak in computer technology.'.

Attitudes to the Pedagogical Challenge of using IT to enhance learning

Suitability of IT for all teachers

It was also argued that IT was not suitable for all teachers. For example, respondent IR-12 was concerned that the enforced use of IT was not appropriate for all teachers.

> *'The government should not force teachers to use IT. Not every teacher has to use IT. Different teachers have different styles. We are seeing each other every day, why bother to use the Intranet when it is more direct to talk to each other.'.*

Persistence of Belief in Traditional Methods of Teaching

Some principals preferred a more direct face to face approach instead of teaching via the internet. For instance, IR-6 claimed:

> *'In terms of the actual transmission of information and knowledge, it's always better to have the teachers in front of the students. I think there is also a better response if the teachers can receive feedback from the students.'.*

According to some principals, many teachers were reluctant to abandon methods with which they were familiar. For example, respondent IR-9 claimed that his teachers were afraid of using computers because due to being unfamiliar with the new technology, both the lesson and students were not easy to manage and control.

> *'They feel more comfortable when the lessons are well structured and students are well-behaved'.*

Most principals claimed that the pedagogy had not actually changed as a result of the use of IT with the same direct teaching methods still being employed. According to Respondent IR-1:

> *'Although some of our teachers have used IT in their daily teaching duties, there is not much difference when compared to using an overhead projector, or chalk and talk that we used before. The pedagogical approach is basically the same, even if IT tools are introduced in teaching.'.*

Reluctance to learn how to integrate IT into classroom teaching

Some principals indicated that one of the obstacles to achieving the paradigm shift in their schools was the reluctance of teachers to learn how to integrate IT into their

teaching. Although respondent IR-3 acknowledged that some progress had been made:

> *'The direction in our school is towards a more interactive and learner-centred approach. However, it is still a long way before it can be achieved. In fact, a teacher who has become IT competent may not necessarily becomes competent or interested in applying IT in teaching.'.*

The need for differentiation

Some respondents were aware of the need to differentiate provision based on age. Respondent IR-5 was mindful of the need to adjust the approach to the age of the children:

> *'It also depends on the target audiences. The need of a primary 1 student is totally different from a primary 6 student. For example, more graphics may be required for lower classes while more text can be accepted by upper classes when the teacher uses the IT tool'.*

Danger of using multi- media resources

One principal associated the use of IT with the provision of stimulating multi-media resources and was concerned that students would find their return to the use of textbooks less stimulating

> *'If students are used to multimedia and diversity, when the teacher goes back to the textbook, they'll find it monotonous and boring.'. (IR-7)*

4.4.3 Major Reasons for Teachers Implementing the ITEd Strategy

Specifically, in Question (7) of the questionnaire, the respondents were allowed to select up to 3 major reasons why the teachers had decided to implement IT in education in their schools. They selected one, two or all three choices.

	Number of respondents	Percentage of respondents
Instructed by Government	65	67.7%
Attract high-quality students	56	58.3%
Parents' expectation	51	53.1%
An innovative teaching and learning method	41	42.7%
Save manpower and resources	31	32.3%
Encourage global contact	22	22.9%
Others	8	8.3%

(Table 4.9) The major reasons why the teachers implemented IT in education

The percentage in the above table is calculated by dividing the number of respondents selecting a particular choice by the total number of respondents (96).

The principals considered the reasons '*instructed by Government*' (67.7%), '*attract high-quality students*' (58.3%) and '*parents' expectation*' (53.1%) to be the major reasons for implementing the IT in education policy compared to an '*innovative teaching and learning method*' (42.7%), to '*save manpower and resources*' (32.3%) and to '*encourage global contact*' (22.9%).

A Mandatory Requirement

It is apparent that the most important reason for implementing the ITEd Strategy was that it was a mandatory requirement backed up by government funding. Two principals (SR-35 and SR-38) claimed that this was the sole reason why they had chosen to implement the IT policy. In the interviews, external factors such as attracting high-quality students and fulfilling expectation of parents were also rated as important factors by some principals (IR-3, IR-8 and IR-11).

An Innovative Teaching and Learning Method

However, significantly, for nearly half of the principals, IT was seen as potentially an innovative method to improve teaching and learning. Three principals (SR-16, SR-40 and SR-70) believed that IT enabled students to work independently and at their own pace:

> *'The students can learn according to their own progress using the computer at home.' (SR-16)*

'Those better students can learn more by using IT themselves.' (SR-40)

'Some students can prepare for the classes in advance if they cannot follow the pace of the teachers.' (SR-70)

Respondent SR-10 commented particularly on the value of multi-media resources:

'The multimedia effect can be applied to attract student's attention'.

Some had grasped the potential of using IT to promote collaborative learning. Respondent IR-4 suggested that:

'Collaborative learning amongst students is one of the major benefits of adopting IT in education.'.

4.4.4 Major Reasons for Teachers Not Implementing ITEd Strategy

In Question (8) of the questionnaire, the principals were allowed to select up to 3 major reasons why the teachers had not implemented the IT in education strategy in their schools. They selected one, two or all three choices.

	Number of respondents	Percentage of respondents
Insufficient time to develop the courseware	77	80.2%
Insufficient skill	59	61.5%
Insufficient facilities	51	53.1%
Insufficient courseware	42	43.8%
Insufficient technical support	25	26.0%
Insufficient funding	16	16.7%
Others	8	8.3%

(Table 4.10) The major reasons for the teachers not implementing IT in education

The percentage in the above table is calculated by dividing the number of respondents selecting a particular choice by the total number of respondents (96).

According to the principals, there were six major reasons why teachers did not implement IT in education. Of these, '*insufficient time to develop the courseware*' and '*insufficient skill*' were the two major considerations, and these accounted respectively

for 80.2% and 61.5% of the respondents. These two factors are related to the teachers directly, notably their lack of technical and IT pedagogical skills.

'*Insufficient facilities*' (53.1%), '*insufficient courseware*' (43.8%) and '*insufficient technical support*' (26.0%) were the next three major reasons for their teachers not implementing IT. These three factors are more related to the school, rather than to the teachers themselves directly.

Insufficient Time and Skill to Develop Courseware

Insufficient time for preparation of IT resources was the major concern at a time when teachers were already under pressure from the introduction of wide ranging educational reform proposals, with Principals arguing that their teachers were already overloaded. For example, respondent SR-38 claimed that preparing IT based teaching resources was very time consuming:

> *'We already have a lot to do due to the reform of the education system and our teachers do not have time to prepare the Powerpoint files for teaching'.*

The same problem was re-iterated by respondent IR-7:

> *'The problem is not in the information and knowledge itself. The major deficiency of the policy is that the Government has not considered the workload of our teachers and the school. All of us are already fully-loaded and we do not have enough time and energy to do what the policy expected.'.*

He also suggested that the problem for teachers was further compounded by the frequent changes of the syllabus:

> *'In principle, it saves time if it's used for many years but unfortunately the syllabus always changes. The teachers feel this kind of investment is not economically sound.'.*

Respondent IR-6 suggested that in order to make changes in teaching approach, some sort of re-allocation of teaching load was essential.

> *'It would need a minimum of 3 months without doing other things to prepare for a course of one semester adopting information technology.'.*

Another principal, IR-10 highlighted the need for differentiated learning resources and the time required for their preparation:

> *'The materials must suit the students' interest and their language ability. It is fun designing Internet lessons, though very time consuming.'*

Respondent IR-8 pointed out that preparing materials using IT exerts too much control over the teaching process and the sequence of learning activities:

> *'It seems to assume that there's a package students have to learn. Students become passive. Too much reliance on information technology will affect the progress of the lessons.'.*

Respondent IR-7 commented specifically on the lack of teachers' skills to develop courseware.

> *'There is a big problem in the implementation and operation of the policy. To be honest, our teachers do not have sufficient skills to prepare the courseware. All they can do is to use the CD-ROM provided by the textbook publisher or simply go to the Internet to download some relevant materials for teaching. It can be said that the full strength of Information Technology cannot be realised in our school.'.*

Poor Classroom Facilities in Schools to accommodate IT facilities

It was also apparent that in some schools, the small size and physical layout of the classrooms had adversely affected the implementation of the ITEd Strategy. Respondent IR-6 reported on the difficulties of re-arranging furniture in classrooms:

> *'The classrooms setting in our school cannot fit the purpose of technological teaching. It would be great to have a classroom where students can actually move around, move chairs, move tables, but we don't have that here. Everything here is fixed.'.*

A similar problem was experienced by respondent IR-2 who outlined the lack of space to accommodate IT equipment:

> *'In fact, our classrooms are so small that they cannot accommodate additional IT equipment. It is time-consuming and troublesome for our teachers to take the notebook computer to the classrooms when they require it. This seriously affects the utilization*

rate of the IT facilities and thus the policy implementation in our school.'.

Respondent IR-8 supported this argument:

> *'The strength of IT is to bring students outside of the classroom, putting them in different situations to experience things they need to learn. However, it is very difficult to realise this in the limited setting of the classroom in Hong Kong.'.*

Suitability of Software

The problem of the lack of suitable resources in the Chinese medium of instruction was also apparent. Some respondents (SR-9, SR-19, SR-54 and SR-78) claimed that there were not enough Chinese-based resources for them to use for their daily teaching and learning activities. Respondent IR-11 suspected that the reason for this was due to:

> *'The market for Chinese courseware is not huge, so there is only limited choice available currently.'.*

He suggested the Government invest or give some incentives for the commercial sector to develop such software. According to Respondent IR-9, abundant resources were available on the internet in English which were not accessible to primary school students in Hong Kong.

> *'There're so many resources on the web but we can't use them directly. We need time to adapt but it's often not enough. Information on the Internet is usually in English, at a level which is too difficult for our students.'.*

Respondent IR-1 was also concerned about the suitability of the software for primary school students:

> *'Software especially some readily available courseware suitable for primary level is not enough. It can be analogous to the situation that you are given a best model of television but do not have suitable programmes for you – it is useless.'.*

4.4.5 The Process of Implementation of the ITEd Strategy

The principals were asked to what extent they agreed with the guidance and support

provided by the government to implement the ITEd Strategy in their schools in Question (14) of the questionnaire and Question (5) of the interview.

Table 4.11 summarises their responses. Generally speaking, less than 30% of the respondents were satisfied with the sufficiency of information on operational details and support for the implementation of the ITEd Strategy in their schools.

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
(a) the respondent is well-informed on the operational details of the policy	5.2%	21.9%	31.2%	29.2%	12.5%
(b) the respondent has sufficient support to implement the policy	6.3%	19.8%	17.7%	40.6%	15.6%
(c) the process of ITEd Strategy implementation is successful	6.3%	22.9%	26.0%	30.2%	14.6%

(Table 4.11) The statistics concerning the process of ITEd Strategy implementation

It was found that only 29.2% of the respondents agreed or strongly agreed that the process of ITEd Strategy implementation was a success. On the other hand, 44.8% of the respondents disagreed or strongly disagreed with this view. 26.0% of the respondents did not have any view.

Guidance on Operational Details

As discussed in Chapter 2, according to government intentions for delegating responsibility to schools, the ITEd Strategy was not meant to be implemented in a top-down manner or adhered to without some flexibility. On the contrary, the Government believed that '*schools should formulate their own IT plans tailored to their specific needs, in the true spirit of school-based management*' (EMB, 1998a, p.24). The schools were informed about some objectives related to the components of the strategy such as target competency level of teachers, the expected IT facilities level in schools and the establishment of local partnerships. Although an inter-departmental task force led by a senior officer in the Education and Manpower Bureau with representatives from other relevant Departments in the Government was in charge of the implementation of the strategy, the government only provided actual targets for the level of IT facilities and teacher professional enablement in terms of hours of professional development (EMB 1998a, Section 7.2). No explicit targets were set for curriculum and resource support and for the level of local partnerships. Nor were operational details provided of tasks to be completed, parameters to be measured, resources to be allocated and manpower to be assigned in the implementation stage of the strategy. So, it was find that only 27.1% of the respondents agreed or strongly agreed that they were well-informed on the operational

details of the policy. On the other hand, 41.7% of the respondents disagreed or strongly disagreed with this statement. 31.2% of the respondents neither agreed nor disagreed. These findings were supplemented by those from the semi-structured interviews.

An Absence of Detailed Central Guidance

For the majority of the respondents, their major concern was the absence of any detailed guidance from the government. This was illustrated by respondent IR-5:

> *'There is no clear indication from the Government of what the schools should do. It will be better for the schools to follow the direction of the Government (if there is any).'*

Respondent SR-39 reiterated the problem suggesting that general guidance in the form of visions and components was inadequate:

> *'We don't know what to do, how to do and where to start. Although a general guideline was given to us, we are still helpless'.*

Respondent SR-62 also called for more explicit guidance on targets and success criteria:

> *'The policy is too vague and we don't know what we should target for except having a lot of equipment'*

One principal, IR-6 claimed that he was unable to evaluate the extent to which the strategy had been a success in his school as he was unsure about criteria which were being used by the government to judge success:

> *'We don't know whether the implementation process in our school has been a success. It is because we do not know how to measure the effectiveness of IT in education. The Government should provide some guidelines or benchmarks with respect to this.'.*

The Need for More Effective Co-ordination at the Centre

There were some aspects of the ITEd Strategy which some principals felt could be handled more effectively centrally. For instance, one principal IR-12 claimed that the

tendering system for purchasing IT services could not be handled effectively at the school level and that the government may handle this centrally:

> *'For the IT services provided to our school, we follow the common practice of the Government to use a tendering system. According to the normal practice, we must select the lowest bid from the proposals received. In fact, some of the contractors will use old technology or provide lower quality service in order to get the contract. I think this is the core and major weaknesses of the policy. Will it be better if the Government centralises this and can have a big bargaining power with the service providers?'*

Some respondents also called for help to resolve the copyright issue when using the internet. According to respondent IR-5:

> *'Our teachers are afraid that the materials downloaded from the Internet are owned by others. On the other hand, they are not eager to upload their own teaching materials to the Internet because they are afraid that these will be used or copied by the others as well. It would be nice if the Government can clearly state about how to handle the copyright issue.'.*

Insufficient Support for Implementation

One of the major sources of dissatisfaction raised by the principals concerned the level of support from the Government for the planning of the implementation of the ITEd Strategy in schools and especially the way in which the funds were made available.

It was found that only 26.1% of the respondents agreed or strongly agreed that they had received sufficient support to implement the policy. On the other hand, 56.2% of the respondents disagreed or strongly disagreed with this statement. 17.7% of the respondents neither agreed nor disagreed.

This concern about the lack of support was reflected in a comment by respondent IR-11:

> *'I am personally in charge of the operational process of the ITEd Strategy. I don't think there is enough support for us to implement the policy.'.*

Funding Arrangements

Respondent IR-2 was concerned by the way in which 'one off' funding arrangements had adversely affected planning:

> *'The funding from the Government to school is not on a regular basis. It depends on the resources of the Government and it is always in terms of one-off funding. This seriously affects our planning to implement IT in education.'.*

Despite the negative comments concerning the support from the Government, there were a few principals (SR-15, SR-47 and SR-73) who held an alternative view. They claimed that there was sufficient funding for their schools to carry out the implementation and this sum of money allowed flexibility for an individual school to use in different areas of IT in education.

The Lack of Principals' IT Competence

Another important finding concerned the perceived lack of IT competence of the primary principals implementing the ITEd Strategy and the need for assistance from skilled technical support. As Respondent IR-5 argued:

> *'I am not an expert in information technology, so I delegate the tasks to my technicians. However, the turnover rate of our IT technician has been extremely high recently due to the recovery of the economic situation.'.*

Lacking in IT competence, Respondent IR-1 also found it necessary to delegate his responsibility to an IT Co-ordinator in the school:

> *'I am officially in-charge of the implementation process because I am the Principal of this school. But the actual operation is done by our IT coordinator. The final decision is endorsed by me although to be honest, I am not very familiar with the technical aspect. In most of the case, I just trust him and do not have enough knowledge to query his suggestions.'.*

The Demand on the Principals' Time

In those cases where the principals considered that they had sufficient knowledge to manage the implementation of the policy, many were concerned by the extent to which the responsibility fell exclusively on their shoulders and the sheer scale of the project. Respondent IR-8 claimed that:

'It took me a lot of time to draw up the IT plan for the school. I mainly worked on my own. When we first started setting up the Intranet, we had a lot of technical problems and occasional breakdowns. Teachers all came to me when these happened. How can I manage to deal with so many demands at a time?'.

The extent to which the implementation of the project had increased their work load was supported by respondent IR-1:

'Following up the installation of the MMLC, arranging training for teachers, writing Quality Education Fund (QEF) quarterly progress reports and financial reports have taken up a lot of my time and energy. I received no clerical support from the school. It seemed that all of a sudden I have become an IT teacher, an IT administrator, not a principal.'.

Another principal, respondent IR-12 was concerned that time spent on managing the introduction of the project had impacted adversely on the time which he had spent with his students.

'During the last few years, I have spent less time with the students, but much more time in dealing with teachers' problems and worries about using technology in the school.'.

Importance of maintaining staff morale

Several respondents stressed the importance of the human factor for the successful implementation of the strategy. As respondent IR-10 revealed:

'Policy implementation can be task oriented, but managers should also consider human factors. If colleagues are unhappy, the end effect is that the morale and the spirit will be dampened.'.

For some, the scale of the change which was required was deemed to be so considerable that it might result in teachers deciding to leave the profession. As respondent SR-25 pointed out:

'If our teachers can choose, I think most of them will retire immediately in order to escape from the demanding changes.'.

4.4.6 What May Do Now to Ensure the Future Development of IT Education in the Primary Schools?

Question (18) of the questionnaire and Question (7) of the interview were used to collect the principals'' comments on what they thought may be done to assist the future development of IT in education in the primary schools. A constant theme was the need for continuing professional development for principals and teachers which could be assisted by the development of a sharing culture. Another significant recommendation was the appointment of more IT experts familiar with pedagogy which would be available to give advice in schools.

Improved support for principals to lead the Implementation of the policy

Respondents (SR-43 and SR-62) admitted that they did not have sufficient knowledge to assist in leading the implementation of ITEd Strategy in their school. Respondent SR-43 argued that:

> *'A more detailed guideline should be designed and provided for us to follow.'.*

whereas, respondent SR-62 suggested that:

> *'Special training for principals in IT in education should be provided by the Government.'.*

Continuous Professional Development for Teachers

Respondent SR-51 was concerned about the preparedness of many teachers for the technical and pedagogical challenge:

> *'Some of our teachers are relatively weak in technical skills and the technology is changing fast.'.*

So, respondent IR-6 suggested more staff development programmes that teach them how to move from the old traditional way to the new way of teaching.

> *'We need to know how to change, know what type of technology to use and when.'.*

To improve the situation, respondent IR-3 suggested the Government set up a virtual training learning centre on the Internet to enable the teachers to learn the latest

technological / pedagogical trend at a time convenient to them.

> *'This learning centre should be built for the aims of life-long learning for the teachers. In the long run, this can save a lot of money for continuous professional development training of the teachers.'.*

Development of a Sharing Culture for skills and resources

In addition to support from the Government, respondent IR-11 argued for the sharing of expertise in collaborative staff-development which could involve:

> *'a small group of people meeting once a month and with a mix of skills in that group, someone with scripting expertise, web design ideas, programming skills and get people to meet up together.'.*

The promotion of a sharing culture was also recommended by other respondents such as IR-10 who suggested that:

> *'We can share work with other schools through the web. Build up materials in a data bank so that they can accumulate and be recycled.'.*

This view was also supported by respondent IR-11 who called for the creation of a government data bank to collate the most appropriate resources

> *'Furthermore, there is too much information / resources in the computing world. Like a library, our teachers need to spend a lot of time to screen and select the appropriate materials for our students. It would be nice if the Government can build a central electronic library, so that the appropriate resources are stored there for access.'.*

Appointment of Consultants/Experts

There were also calls for new IT appointments to be made attached to each school which included IT consultants and directors. Respondent SR-36 suggested that the government:

> *' should set up a new position in school for responsible IT. A team of IT consultants in education, instead of only one Technical Support Specialist (TSS) should be allocated to each school to carry out the implementation. This is because the main responsibility*

of the teacher is to teach students instead of working in front of computers'.

In addition, respondent IR-3 suggested the appointment of a new IT Director in each school.

> *'The candidate for this post should possess good qualifications and experience in technological education. The ranking of such a post should be set at the level of vice-principal, in order to attract high calibre people to apply for.'.*

Another respondent, IR-6 suggested what their school would welcome a knowledge manager:

> *'who can search the Web for the latest links, demos, suitable games, etc. about this topic'.*

The problem of technical staff lacking IT pedagogical skills was often cited. As respondent IR-1 pointed out:

> *'The implementation process was carried out by the two technical staff. They are deficient in the sense that they are not familiar with teaching. I think this could be improved because they're good technicians but they've never been in front of a classroom with 40 students.'.*

Based on the belief that the IT experts may not be familiar with pedagogy, respondent IR-3 suggested the Government send some IT people who would like to work in primary schools to the Hong Kong Institute of Education for training by a group of subject specialists, for example Chinese, Mathematics, etc.

> *'By doing this, these IT people can build a more solid view of what is teaching and learning in primary school and thus be able to use IT to facilitate the process.'.*

The Need for Curriculum Reform

Some respondents felt that the ITEd Strategy could only succeed if appropriate changes in other aspects of school were made such as making adjustments in the curriculum, changing time allocations for lessons, and reducing the size of classes. Respondent SR-54 suggested changes to be made in the primary curriculum to accommodate IT.

'The curriculum should be changed to fit the aims of IT in education. It is difficult if the students still need to follow the syllabus of the existing curriculum'.

Respondents (SR-25 and SR-40) claimed that the lesson time was too short which did not allow sufficient time for the teachers to start the machine, load the software and turn off the machine in a lesson; all of this wasted valuable teaching time. This situation was also commented on by respondent IR-9:

'we have only 35 minutes for a lesson. If you have to spend 10 minutes setting up the equipment, the 40 students would become very impatient and you need 5 minutes to settle them. You must be very efficient.'.

Respondent SR-25 also commented on the large size of classes:

'the class size is too big for the effective implementation of IT in teaching and learning'.

Linking teachers' IT Competence Level to Incentives Scheme

Some principals called for new tests and standards to measure the competence of teachers using IT and for teachers to be rewarded for their efforts with gifts and improved chances of promotion. Respondent SR-58 suggested:

'To encourage teachers to use IT, I think the government can use some tests or assessment to grade the teachers'.

Respondent SR-50 claimed that:

'A benchmark can be decided and used to measure the utilization and effectiveness of individual teachers to implement IT in primary schools but this should be conducted on a voluntary base. If the teacher can attain a certain level, some motivation such as job promotion should be considered'.

There were some suggestions, that effective IT practitioners may be rewarded.

'Some extra reward should be given to teachers who can implement IT in education effectively'. (SR-70)

This suggestion was taken further by respondent IR-4.

> *'Some incentives should be introduced to motivate teachers to learn and apply IT in their daily work. For example, a notebook computer can be awarded to a teacher if s/he can complete a certain number of recognized training courses within an academic year.',*

Educating Parents

Some principals were mindful that not all students enjoy being taught using IT, preferring instead to remain passive learners in more traditional classrooms. In some cases, their reluctance was supported by their parents who did not understand the way in which IT can enhance teaching and learning. Respondent IR-12 reflected that:

> *'Some of the students hate the teachers using information technology in teaching. It is because the students have to work, they can't sleep in the corner and do nothing anymore. Some parents even complained that this is not how the children are supposed to learn. The parents expect the teachers to tell the children exactly what and how to do something instead of asking them to explore themselves. Parents should learn how to assist their children at home to use IT in their learning.'*

To improve the situation, respondent SR-49 suggested that some training for parents may be conducted to teach them how to co-operate with schools in the implementation of the ITEd Strategy.

4.5 Summary of the Findings

In phase one of the research, the whole population of primary schools was surveyed and 18.0% of respondents replied. 12 primary schools were then selected by stratified random selection from all 539 primary schools for semi-structured interviews in phase two of the research.

In the survey, only 28.1% of the respondents agreed that *'The ITEd Strategy had been implemented successfully in their schools to achieve its desired outcome of a paradigm shift from a largely textbook-based teacher-oriented approach to a more interactive and learner-centred approach'*. Below is the summary of the findings related to the four main research questions.

Research Question One: To what extent do primary school principals believe that the visions of the ITEd Strategy have been achieved?

In the ITEd Strategy, four visions were identified by the Government which were intended to provide schools with some strategic direction. In the survey, it was found that only 20.9%, 31.2%, 30.2% and 24.0% of principals respectively agreed that these 4 visions had been achieved in their schools. This was despite the fact that 58.3%, 61.4%, 54.2% and 56.3% of principals respectively supported the key visions of the Strategy. Interestingly, their views about the advantages of using IT reflect the restricted use of the technology; it was still predominantly used as a presentation tool in teaching. Most felt that there had been little or no change in the pedagogy as a result of the introduction of IT.

Research Question Two: How far have the policy's central components contributed to its success?

Also, only 18.8%, 21.9%, 22.9% and 27.1% of principals respectively agreed with the contribution of the four central components of the ITEd Strategy to its success in their schools. Furthermore, less than 30% of the respondents agreed that the process of ITEd Strategy implementation had been a success. With respect to the central components, insufficient IT facilities, inadequate technical support, an inappropriate focus of professional development on technical skill instead of IT pedagogical knowledge and skills, insufficient curriculum and resource support and the absence of local partnerships to support the paradigm shift were all major contributory factors why schools did not implement IT in education strategy as previously intended.

In terms of the impact on their students, the respondents claimed that 37.5% of students had shown improvement in understanding the teaching materials but only 14.6% students had shown improvement in their performance after using IT. Furthermore, it was observed by the respondents that most students just treated IT as a subject in its own right, as content to be learned (49.0%), rather than as a medium or literacy that had relevance and benefits across the curriculum.

Research Question Three: To what extent is the meeting of objectives related to individual school characteristics?

There was evidence in the study that the achievement of ITEd Strategy in individual

primary schools was to some extent positively related to the size of schools and the schools' previous IT experience but negatively related to the age of schools.

Research Question Four: What other factors have helped or hindered teachers to implement the policy?

Besides the contribution of the policy's central components to the success of the ITEd Strategy, the study identified some other factors which had helped or hindered schools to implement the ITEd Strategy. These include: support level from the principals towards the policy, beliefs of teachers about the use of IT to enhance learning, attitudes of teachers to the pedagogical challenge of using IT to enhance learning, and the quality of central guidance and support for the process of implementation of the policy. It can be argued that these factors at the implementation stage at the school level were as important as the central components suggested by the Government at the policy formulation stage. To help in the implementation of the policy, the principals made some valuable suggestions such as improved support for principals to lead the implementation of the policy, appointments of consultants/experts, reform of the curriculum, linking teachers' IT competence level to an incentives scheme and providing relevant education to parents.

Chapter 5 Discussion of the Research Findings

To cope with the need for economic competitiveness and the pressure of globalisation, Hong Kong Government policy statements in 1998 indicated that the use of IT was intended to play a key role in developing learners' capabilities. This was to be achieved by the use of more innovative teaching and improved management. A 5-year ITEd Strategy (EMB, 1998a; EMB, 2004a) was then introduced to achieve a paradigm shift in teaching and learning in both primary and secondary education in Hong Kong. This research was an evaluative study which was intended to investigate the process of implementation of the ITEd Strategy and its impact on practice in primary schools.

In this study, the main research questions were: to what extent have primary schools achieved a paradigm shift from a largely textbook-based teacher-centred approach to a more interactive and learner-centred approach, and what factors have helped or hindered the implementation of the ITEd Strategy? The specific research questions were:

(1) To what extent do primary school principals believe that the visions of the ITEd Strategy have been achieved?
(2) How far have the policy's central components contributed to its success?
(3) To what extent is the meeting of objectives in individual schools related to specific school characteristics?
(4) What other factors have helped or hindered teachers in schools to implement the ITEd Strategy?

In the remainder of this chapter, the findings for these research questions will be discussed.

5.1 Findings for Research Question One: To What Extent Do Primary School Principals Believe That the Visions of the ITEd Strategy Have Been Achieved?

The intention of the ITEd Strategy had been to use IT to spearhead a paradigm shift in teaching and learning in both primary and secondary schools in Hong Kong. The four visions in the Strategy document (EMB, 1998a) suggested that the intended outcome would be students who would develop attitudes and skills which would equip them to become independent life-long learners. In particular, students were to become more motivated to learn, become more creative, and develop a range of information

handling skills with IT as the medium. They would have access to a vastly increased range of information via the internet.

As Hirumi (2002) and others (Harden and Crosby, 2000; Woolfolk, 1993) have demonstrated, the achievement of the intended paradigm shift required a fundamental change in pedagogy and assessment in the classroom. In order to fully maximise the potential benefits of IT, teachers needed to move away from a teacher centred to a more student centred one. It particular required an understanding of how IT could be used to help students become more autonomous learners. This constituted a major challenge which required that teachers in addition to using direct teaching learn how to become facilitators, create appropriately challenging learning tasks using IT, support co-operative group work and practise formative assessment (Ravet and Layte,, 1997).

61.5% principals perceived that a paradigm shift had not been achieved. It was apparent that progress had been both slow and uneven across the four visions. According to the survey, 31.2%, 38.6%, 34.4% and 48.9% of principals respectively did not agree that the four visions had been achieved in their schools. Of the four visions, most progress was perceived to have been achieved in providing access to a wide range of resources; this was perhaps in view of the IT facilities which had been provided. Much less progress appears to have been achieved in developing students' attitudes and skills for independent learning.

Although there was a wide ranging discussion about the need to change the role of teachers in order to implement IT in education, there was little evidence that this had happened in classrooms. Concern was often expressed by principals that the potential of IT to enhance learning was not being fully exploited by their teachers. In line with the findings of Sandholtz et al. (1997), many teachers used IT to support existing approaches, mainly using IT as word processing and presentation tools for teaching and learning; the way in which they were used was not much different from using a typewriter and overhead projector. This suggests that information technology in Hong Kong primary schools was only performing one of the four different roles (a medium for teaching and learning, as an assisting tool, as an object and as a tool for organisation and management in schools) which were identified by educational researchers (Merill et al., 1996; SER, 1998; Moonen and Kommers, 1995; Pilot, 1998).

It is argued that it is very important that teachers should appreciate the need for using

IT in education and be receptive to the challenge of taking up a new role as learning facilitator, working alongside rather than simply using computer technology (Mumtaz, 2000). According to Taylor (1980), all educational applications of computers could be placed in one of three major classifications: tutor, tool and tutee. In this study, principals claimed that the main use of IT in school was as a tool similar to a pen, chalk or overhead transparency only. 65.6% principals reported that their teachers used IT to support direct teaching, especially explanation and presentation rather than exploiting the potential of IT. Evidence of the systematic teaching of information handling skills using IT such as accessing information from the internet was scarce.

In term of the students' role, it was apparent that many primary students were still at the beginning stage of learning using IT (Lau, 1998). 49.0% of the principals reported that their students held a view of IT in education as 'learning about IT'; very few students were able to 'learn from IT' or 'manage learning with IT'. Although Dwyer (1994) argued that IT can provide an array of tools for students to acquire information, the majority of principals felt that their students had not developed capabilities to process information effectively and efficiently. Students often copied information without acquiring any real understanding. Forsyth (1996) reported that students should be able to direct their own studies to a greater extent, with the teacher acting as a guide or facilitator rather than as an instructor after adopting IT in teaching and learning. However, these outcomes were not apparent in the study, as it was found that only 37.5% respondents reported that their teachers had changed their teaching approach from teacher-oriented to student-oriented.

On the other hand, it was reported students in some schools (20.9%) had became more motivated to learn partly due to the availability of multimedia materials. There was some evidence that the use of the internet had encouraged students to become more pro-active in their learning, seeking out information, and asking questions in class.

5.2 Findings for Research Question Two: How Far Have the Policy's Central Components Contributed to Its Success?

Besides promoting the four visions of the ITEd Strategy, four central components were considered to be the second strategic direction of the Government:

> *(a) To provide adequate IT facilities, including network facilities, for our students and teachers to enable them to access information (EMB, 1998a, Chapter 3)*
>
> *(b) To encourage key players in the school system to take up the challenges of their*

respective new roles (EMB, 1998a, Chapter 4)

(c) *To integrate IT into school education meaningfully through necessary curriculum and resource support (EMB, 1998a, Chapter 5)*

(d) *To foster the emergence of a community-wide environment conducive to the culture change (EMB, 1998a, Chapter 6)*

The survey revealed that only 18.8%, 21.9%, 22.9% and 27.1% of principals, respectively agreed or strongly agreed that these four components had contributed to the successful implementation of the policy in their schools. The interviews provided further evidence for this research question.

5.2.1 The Provision of IT Facilities

From the principals' point of view, the inadequacy of the IT facilities appeared to be one of the most serious problems affecting the implementation of the strategy. This was a hindrance to a greater use of IT in teaching previously identified (Brummelhius and Plomp, 1994; Lee, 2001; Matengu, 2006). The majority of principals reported that the IT facilities were insufficient and outdated in their schools due to insufficient funding. With the exception of basic core hardware and software, the resources supplied by the Hong Kong Government to primary schools took the form of a one off payment rather than recurrent funding which made it difficult for the principals to plan ahead.

However, funding decisions taken by the principals also had a significant impact on the availability of resources for use in the ITEd Strategy. Due to the promotion of school-based management and delegation of responsibility for how the strategy would be implemented, the principals were able to allocate government funds to different areas of ITEd or other non-IT aspects or to allocate other non-IT resources to IT. So, the attitudes and preferences of the principals towards IT in education had a significant impact on the availability of IT resources in individual schools (Kearsley and Lynch, 1992).

Furthermore, the Government intended to use IT in education to attain a cultural change by promoting Chinese as the medium of instruction (EMB, 1998a, Section 1.4). The principals argued that the Government had not made sufficient investment in the development of suitable resources for the ITEd Strategy. The findings indicated that there were insufficient technological teaching resources available in Chinese due to the limited market for Chinese courseware in Hong Kong. In addition, little

progress in schools had been made to develop school-based IT resources to support the integration of IT into the curriculum.

5.2.2 Teacher Engagement and Professional Development

It was shown previously that teacher engagement and continuing professional development are very important to the success of any new innovation (Colley et al., 2002); the implementation of the ITEd Strategy was no exception where the effective use of technology depends on the knowledge and skills of the teacher (Heck and Wallace, 1999). According to Sergeant (2001), the problem of introducing new ideas into school is related to the human problems of dealing with the resistance, anxieties, etc. This resistance and anxiety included principals' and teachers' attitudes to the use of IT to enhance learning, readiness for change and attitudes to the pedagogical challenge of using IT. In the ITEd Strategy which was intended to assist in achieving a paradigm shift in teaching and learning using IT (EMB, 1998a), these values and attitudes affected principals, teachers and students to varying degrees.

Attitudes to the use of IT to enhance learning

In the ITEd Strategy which required the frontline principals and teachers to carry out the implementation (EMB, 1998a), one of the perceived scale of the challenge that two principals were sceptical of relying on IT alone to achieve the intended paradigm shift. As previously discussed, some teachers are hesitant to immerse their students in IT enabled learning environments because they are not confident that IT will benefit their students (Healey, 2005; Schmidt and Callahan, 1992; Drier, 2001). A principal was concerned that IT can exert excessive control over learning. Two principals were concerned about the use of multi-media resources rather than textbook and the effect that the reversion to the use of the text-book would have on student motivation. Five principals were also sceptical of the appropriateness of IT for young children.

Readiness for change

Principals with positive attitudes towards the use of IT are more likely to transmit these attitudes to their teachers (Granger et al, 2002). It is apparent that fundamental values and beliefs of many teachers about the use of IT had not changed. Some of the teachers believed that technology cannot take over a teacher's role (Downes, 1999). Fear of change and commitment among teachers is often the bottleneck affecting the use of the technology (Crane, 2000). In the ITEd Strategy, the majority of the principals interviewed appreciated the potential of IT to enhance students' learning by helping them to control the pace of their learning and for an improved understanding

of concepts. They were prepared to change with the assistance of continuing professional development for them and their teachers. However, the professional development programme for teachers in the ITEd Strategy was often perceived to be irrelevant to their needs, poorly timed and often focussed mainly on technical training. As explained by Creighton (2003), if the focus is on technical training, the outcome could be only the acquisition of technical skills and little understanding of IT integration. So, how IT can be used to enhance teaching and learning in a social-constructivist learning environment needs to be the focus of professional development of teachers.

Teachers' attitudes to the pedagogical challenge of using IT to enhance learning

As explained by Papert (1993), a change of mind and culture was required which was always going to be both contentious and difficult for teachers. Teachers' attitudes to the pedagogical challenge of using IT to enhance learning affected both teachers reluctance to take on the impending change and their competence to execute the change in the classroom. In terms of their reluctance, many were sceptical about student-centred learning approaches to learning. Some were fearful of a possible changed relationship with students and loss of control as a result of using IT in the classroom (Tiene and Ingram, 2001). They had a marked preference for direct teaching based on a belief in a transmission theory of learning. Many were also mindful of the 'backwash effect' of examinations on their teaching as inevitably they would be judged by the success of their students in the examinations at the end of the primary phase (McFarlane and de Rijcke, 1999). In terms of their competence to implement the change, a principal reported that some of their teachers feared being seen as having inferior technical skills compared with their students. They lacked the pedagogical skills to integrate IT into classroom routines. According to Fabry and Higgs (1997), both of these were perceived to be fundamental changes which teachers would be required to make. Large number of principals (80.2%) were also aware of the considerable time which it takes to produce teaching resources as an alternative to the textbook an issue which was identified by Poole (1997) as a significant factor.

5.2.3 Curriculum Adaptation to Support the Integration of IT into the Curriculum

The level of external support in the implementation stage was very important. It has been argued that when educational technology is used to enhance teaching and learning, the curriculum must be changed to match the requirement of the new pedagogies (Roblyer and Edwards, 2000; Law et al., 2003). However, it was reported in the findings that there was little or no change in the existing curriculum in order to

incorporate information technology. The teachers were still required to follow the standard curriculum for primary education suggested by the Government. The School Administration and Management System (SAMS) developed and operated by Education Department was the major use of IT in schools. It could be argued that the future success of the policy may be in doubt if the curriculum is not changed.

5.2.4 Community Participation

As commented by Uemura (1999), schools cannot and should not operate as separate entities within society. Law et al. (2003) also discovered that a school environment which supports curriculum and reform was a strong contributing factor towards the success of IT implementation. The impact of the ITEd Strategy is not limited to the schools alone; it affects the whole society and lasts for a long time. It was generally believed that education may not only take place in schools but also within families, communities, and society. It was believed that these partnerships would shape the operational levels significantly and their influences are very significant (EMB, 1998a). However, it has been shown that community participation in the ITEd Strategy at the school level was limited. So, the participation from other stakeholders such as parents, tertiary institutes, commercial sectors, etc. of the community in the ITEd Strategy needs to be promoted and encouraged.

5.3 Findings for Research Question Three: To What Extent Was the Meeting of Objectives in Individual Schools Related to Specific School Characteristics?

As discussed, the School Management Initiative (SMI) was introduced into Hong Kong Schools in 1991 to enhance the accountability of individual schools (Education Department, 1991). Aligned with this initiative, the third strategic direction of the ITEd Strategy suggested the distributed implementation of the policy in individual schools (EMB, 1998a). It was not a detailed strategy which schools were required to follow. Rather, the HKSAR allowed individual schools to develop their own strategies to meet the needs of their own students and staff in order to achieve the four specific visions:

> *'This strategy is not meant to be implemented in a top-down manner or adhered to without flexibility. Quite the contrary, schools should formulate their own IT plans tailored to their specific needs, in the true spirit of school-based management. It is for the same reason that we are carrying out the IT pilot scheme to identify best practices*

and strategies for schools in Hong Kong…..' (EMB, 1998a, p.24)

The process of implementation and impact of any education policy in different schools would vary widely due to their own characteristics (Smith, 1973; Ball, 2006; Bell and Stevenson, 2006). So, in the study, selected characteristics of individual schools were analysed to find out their relationships to the meeting of objectives of the ITEd Strategy.

The study found that the relationships between different type of schools, namely government, aided or direct subsidy, to the meeting of objectives of the ITEd Strategy was insignificant. It can be inferred that the type of school was not a factor which had contributed to the success of the implementation of the ITEd Strategy.

In contrast, it was found that school age, school size and previous IT experience had affected the success of implementation of the ITEd Strategy in individual schools. The study showed that a recently established school had a higher chance of success and it can be argued that the physical layout and infrastructure of a more recently built school is more appropriate for the use of new educational technology. The study also showed that schools which had longer experience in implementing IT in education had a higher chance of success in the ITEd Strategy confirming that experience is important for using IT in education. In terms of the size of school, it was found that a school with a larger number of students or teachers also positively correlated with success in carrying the ITEd Strategy. In this sense, it can be argued that the phenomenon of economies of scale can be applied to implementing IT in education.

It was also noted that the size and layout of the classrooms in the schools may affect the effectiveness of the ITEd Strategy. The size of the classrooms in Hong Kong is generally small and this has a negative impact on the adoption of technology in daily teaching and learning because the classrooms cannot accommodate additional IT equipment permanently. To improve the use of IT in education, it was suggested the furniture in the classrooms should be moveable as well.

5.4 Findings for Research Question Four: What Other Factors have Helped or Hindered Teachers in School to Implement ITEd Strategy?

As discussed previously in Section 2.5 and 2.6, the school implementing the ITEd Strategy may interpret its content differently (EMB, 1998a), so the ITEd Strategy may be understood as a plurality of policies that emerge and develop as the policy process

moves from formulation to implementation. Influences due to the supporting and resisting forces from different stakeholders were exerted at an institutional level in which policy was actually implemented (Bell and Stevenson, 2006). In this section, other supporting and resisting factors that principals perceived had helped or hindered teachers in schools to implement the ITEd Strategy will be discussed. These include the principals' belief in the visions of the strategy, the process of the implementation and its strengths and weaknesses, and the actions which felt were necessary to improve the implementation of the strategy.

5.4.1 To What Extent did the Principals Believe in the Visions of the Strategy?

The role of the principals was crucial in helping to translate the strategic visions into reality (Kearsley and Lynch, 1992; Poole et al., 2006; Sergeant, 2001). Kearsley and Lynch (1992) observed that the ability to develop and articulate a vision of how IT could produce instructional changes is a critical element in IT leadership. Law et al. (2003) further discovered that a school environment which supports curriculum innovation and reform was a strong contributing factor towards the success of IT implementation. The principals' belief in the visions of the strategy was one of the main factors that would be likely to affect the implementation.

Overall, more than half of the principals supported the four visions of the ITEd Strategy. Respectively 58.3%, 61.4%, 54.2% and 56.3% of the principals supported or strongly supported the key visions of the ITEd Strategy. Support for vision 2, access to resources was perceived to be slightly more important than the others with support from a little over 60% of principals.

Three principals in the interviews doubted the effectiveness of a learner-centred approach; one even emphasized that no other teaching approach could replace face-to-face teaching. This appears to be contrary to Kirkman et al.'s (2002) belief that gains in student learning will be achieved after appropriate pedagogical reform. Others principals (62.5%) claimed that the teachers in their schools still insisted on using a traditional teacher-centred approach. Some (61.5%) were concerned about the lack of their own technical skills. In practice, nearly half (45.8%) of the principals indicated that equipping students with modern technology skills did not imply that their students would be able to apply IT effectively and efficiently.

5.4.2 What were the Principals Perceptions of the process of Policy Implementation?

The HKSAR allowed individual schools to determine the implementation of the ITEd Strategy to meet the needs of their own students and staff. So, the process of the implementation varied according to different schools. In other words, although schools were required to respond to centrally imposed guidelines, the effectiveness of changes ultimately derived from the efforts of practitioners themselves rather than from legislation or regulations (Whittaker, 1993).

Despite the support of the principals for the visions, there were only 29.2% who claimed that the process of ITEd Strategy implementation in their schools had been successful. The process of ITEd Strategy implementation was perceived to have significant deficiencies. This supports what Taylor et al. (1997) described as 'policy refraction' in which distortions and gaps appear in the implementation process. Two principals in the interviews were concerned by competing priorities such as student recruitment as a consequence of the fall of the birth rate. The majority of principals (72.9%) were sceptical of the extent to which they were expected to accept delegated responsibility for the implementation of the strategy and wanted more central direction. Four principals in the interviews felt frustrated because the government's policy implementation guideline was too vague preferring a more detailed and specific set of instructions; for instance, some were unsure of what criteria would be used to evaluate their progress. Overall, only 27.1% agreed that they were well-informed on the operational details of the policy.

One of their major sources of dissatisfaction concerned the level of support from the Government to implement the ITEd Strategy in schools and this contributed to their reluctance to change practice. Only 26.1% of them agreed that they had received sufficient support. This supports Cuban's claim that a lack of thoughtful, comprehensive, and systematic implementation plans for using the array of new technologies available is a major reason for the resistance to change (Cuban, 2001). This especially applied to the way in which the funds were made available in an ad-hoc one-off basis rather than continuous manner and the lack of IT qualified manpower resource. This was compounded by their own admission that they were not knowledgeable enough to monitor the implementation of the strategy.

5.4.3 What did the Principals See as the Strengths and Weaknesses of the implementation of the Policy?

According to government intentions for delegating responsibility to schools, the ITEd Strategy was not meant to be implemented in a top-down manner or adhered to without some flexibility (EMB, 1998a). Some principals considered this to be one of the strengths of the strategy for the implementation of the policy as they were able to formulate their own IT plans tailored to their specific needs. However, many more (73.9%) felt that the absence of detailed guidance for the operational details of the policy caused considerable difficulties for their schools. They expected the Government to provide operational guidance on the detailed timeframe to be met, tasks to be done, parameters to be measured, resources to be allocated and manpower to be assigned for the implementation stage of the strategy.

Another concern was the funding for IT facilities. Whilst some principals (18.8%) claimed that the funding and equipment was sufficient or even more than enough for schools, many more principals (43.7%) pointed out that their equipment was outdated and that they did not have sufficient recurrent money for replacement. Furthermore, the appropriateness and language of the software / courseware could not fulfil what the schools expected. Insufficient manpower resource was another weakness of the policy.

As suggested by Fabry and Higgs (1997), for teachers to effectively integrate IT into classroom practices, they may make two radical changes: learning to use technology and changing how they teach. Many principals appreciated that their teachers were not yet ready to take on the pedagogical challenge of integrating IT into their teaching. Furthermore, there was evidence that the professional development for principals and teachers focused on the technical aspect instead of the integration of information technology into their classroom practices. This was due to the inappropriate personnel and approach provided by the training institutes for upgrading the knowledge and skills of principals and teachers.

5.4.4 What did the Principals Think Could be Done to Improve the Policy?

The unintended results of the policy in the implementation stage compared with the planned results in the formulation stage may be due to the fact that the ITEd Strategy was not a detailed strategy in which schools were required to implement practices on

their own. If a policy such as ITEd Strategy is open to differing interpretation by practitioners, this is likely to result in differences in implementation. Such differences will be magnified, as the unique school characteristics and supporting or resistance factors prevailing in each institution further shape the implementation of the policy (Smith, 1973; Ball, 2006; Bell and Stevenson, 2006).

Since it is impossible to outline all policy implementation steps in the policy formulation stage, the distortions and gaps appeared in the implementation process of the ITEd Strategy resulting in '*policy refraction*' as described by Taylor et al. (1997). It can be argued that the introduction of IT into education could not be easily achieved at the institution level by the sole effort of an individual school.

It has been identified that institutional values and commitments (Kearsley and Lynch, 1992) that determine the organization principles are important factors affecting the success of the ITEd implementation. The school management has a significant effect on the introduction of any new change in the school. So, to ensure the future development of IT education in the primary schools, some principals (56.2%) believed that more clearly defined guidance and special leadership training in the area of educational technology may be provided for them.

It is argued that when educational technology is used in the classroom, the curriculum must be changed to match the requirement of the new pedagogies (Roblyer and Edwards, 2000). The principals in this study also claimed that certain changes to other parameters of primary education such as reducing the class size, revising the curriculum and educating parents in the potential of IT to aid learning may be considered in order to make IT in education more effective. Four principals suggested ways of improving teachers' motivation by implementing a voluntary benchmark system for promotion or an extra award for teachers who were able to adopt the new technology in teaching and learning. It is to be expected if teachers' hearts and minds were touched by such motivators, they were likely to be willing to make change (Hawley, 2002).

Roblyer and Edwards (2000) argued that one of the reasons technology is not working as well or as efficiently as many had hoped, is that too frequently technology is chosen for inappropriate reasons. Many principals claimed that they did not have enough knowledge to judge or decide the different use of IT in schools. They suggested that a team of consultants of IT in education may be allocated to each school to provide professional advice to assist the ITEd implementation and reduce

the workload of teachers. Regarding the additional expertise for the school, they felt that the appointment of IT Director, Knowledge Manager and Script Writer may be considered.

In addition, two principals suggested the Government build a central electronic library so that the appropriate resources could be stored for teachers to access. A sharing culture amongst the schools may be promoted to save the effort and time teachers require to implement IT in education. Another two principals also emphasized that parent education about the potential use of IT in education may be conducted to facilitate their co-operation with the schools.

Lastly, it was suggested that the Government should consider seriously the impact of the policy on the students, for example, the equity of receiving technological education, the IT literacy level of the students and the impact of IT on their physical health in order to improve the success level of the Policy in the future.

5.5 Summary

The purposes of the study were to investigate the impact of the ITEd Strategy on school practices and to establish the factors which affected the implementation.

In the study, the success of the implementation was found to be affected by the balance between central government direction and the autonomy given to school principals in a situation where school based management was being promoted. The effectiveness of the policy was a doubt due to the way in which the policy was implemented. There were tensions between the formulation and implementation of the ITEd Strategy which impacted on the success of the project.

Chapter 6 Conclusion

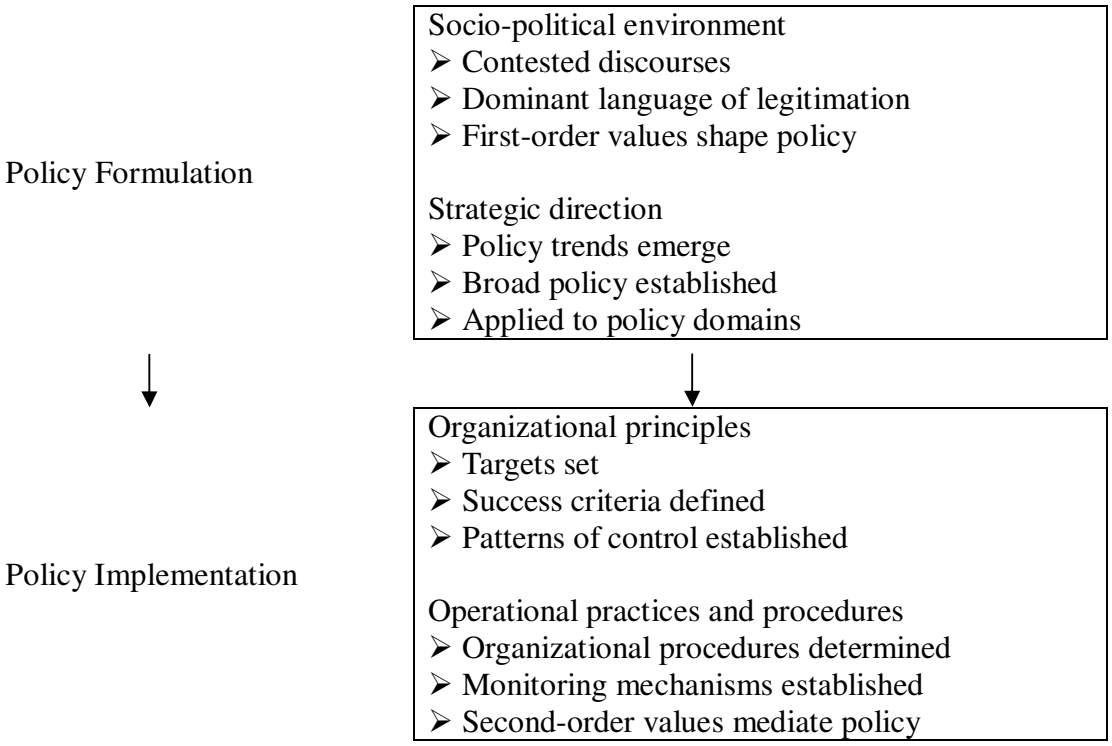
This chapter provides a summary of the research findings, their implications, limitations of the research and potential for future research. In this research, the ITEd Strategy (EMB, 1998a; EMB, 2004a) was selected as a case-study in policy analysis. Although the experience of each individual learner is decisively shaped by the wider policy environment, there is often an underdeveloped understanding of how education policy is formed, how it is implemented and how it impacts on schools and colleges (Bell and Stevenson, 2006). The extent to which the implementation of the ITEd Strategy was successful in each school was likely to be affected by the balance between central government direction and the autonomy afforded to school principals in a situation where school based management and accountability was being promoted. The implementation would also be affected by institutional values and commitments in individual schools and operational practices.

In the education arena, Hong Kong is currently attempting to implement radical and far-reaching transformation, both in terms of preparing students for a future 'information society' and in terms of transforming teaching and learning with information technologies. Since 2001, the scope, magnitude and pace of curriculum, pedagogical and assessment reform have affected all schools. Curriculum reform proposals include an emphasis on Key Learning Tasks of which Learning with IT is one along with Moral and Civic education, Reading to Learn and Project Learning.

Although the ITEd Strategy was initiated in 1998 and updated in 2004, it was designed to have a long-term impact that may be different from its original intention as the policy process moves from formulation at the government level to implementation in schools (EMB, 1998a; EMB, 2004a). It is now 10 years into the implementation of the strategy and this provides an appropriate point to evaluate its success. A previous review of progress on the use of IT in schools in Hong Kong (Law et al., 2001) had identified some progress in the provision of hardware but teachers' technical skills and IT pedagogical skills were still limited. Hong Kong Polytechnic University (HKPU, 2005) had further identified significant improvement of IT infrastructure, teachers' training, IT culture in schools and computer use for teaching and learning.

6.1 Summary of the Conceptual Framework

In this study, particular emphasis has been placed on the implementation phase of policy analysis. The four-stage policy development process, consisting of two formulation and two implementation stages suggested by Bell and Stevenson (2006) was adopted as the conceptual framework for the research. These four stages were:



This policy framework was used as the conceptual framework for this research along with a framework devised by Hirumi (2002) which compared aspects of teacher-centred and learner-centred approaches to learning and provided some indication of the challenges for teachers in achieving the intended paradigm shift.

In the table below, these four stages are used to conceptualise the formulation and implementation of the ITEd Strategy in Hong Kong for the purpose of analysis.

Policy formulation at the Government level

Socio-political environment	• Need to improve human capital by modernisation of the education system and curriculum and pedagogical reform • Chinese as the medium of instruction
Strategic direction	Broad policy directions: • A paradigm shift in teaching and learning involving the use of IT • Four key visions concerned with student learning outcomes • Four key components: IT facilities; engagement and professional development; curriculum adaptation and resource support and local partnerships • Distributed implementation

Implementation of policy at school level

Organisational principles	Parameters within which policy was to be implemented: • Upward accountability to ED • Values and attitudes of principals and teachers: Attitudes to IT and pedagogical challenge of exploiting the potential of IT to enhance learning • Commitments and readiness for change
Operational practices and procedures	Detailed organisational arrangements for implementation: • Expected use of IT • Provision of IT facilities • Arrangements for teachers' professional development - technical and pedagogical IT skills • Planning of integration of IT into the curriculum • Local partnerships

(Table 6.1) The formulation and implementation of ITEd Strategy in Hong Kong

6.2 Summary of the Research Methodology

The central aim of the study was to evaluate the extent to which the IT in Education Strategy had been successfully implemented in primary schools in Hong Kong to achieve a paradigm shift from a largely textbook-based teacher oriented approach to a more interactive and learner-centred approach and how the implementation was influenced by a variety of factors. In order to achieve the central aim, four specific research questions were identified.

The evidence was collected in two phases. In the first phase of the study, the perceptions of all primary school principals in the 533 schools in Hong Kong were surveyed using a self-administrated questionnaire and 96 of them (18%) responded. In the second phase, 12 principals selected by stratified sampling were interviewed to collect qualitative information to supplement the findings from the survey.

6.3 Summary of the Findings

The research concluded that there was tension between the formulation of the ITEd Strategy and its implementation in schools. Despite the principals' support for the visions of the strategy, the potential of IT to transform learning was not fully realised. The beginnings of a change in teaching and learning approach prompted by the use of IT were evident but there appeared to be considerable variation in practice between schools. This was because of the failure of the Hong Kong Government to anticipate the extent of the challenge and to provide sufficient guidance and support to overcome barriers to change which arose during the implementation phase.

The findings of this study concerning the four specific research questions are summarised below.

6.3.1 Summary for Research Question One: To What Extent Do Primary School Principals Believe That the Visions of the ITEd Strategy Have Been Achieved?

The findings for Research Question One are summarised according to the four visions of the ITEd Strategy.

Achievement of the First Vision – turn the schools into dynamic and innovative learning institutions

Just over half of the principals perceived that teaching had become more interactive (from uni-directional to bi-directional) which had been one of the original aims of the strategy. Although there was perceived to be some movement away from the use of textbooks to IT resources produced by the teacher, teachers were using them to support existing approaches to teaching such as presentation. Some aspects however had apparently proved much more resistant to change. Little progress had been made in helping the students to 'learn how to learn' which is an important aspect of students being responsible for their own learning and becoming more autonomous. In Hong Kong, the role of the primary teacher did not become a facilitator which is a major indicator for learner-centred approach after the ITEd Strategy was implemented.

From the student perspective, there was little evidence of students becoming more motivated, inquisitive and creative learners. IT was not utilized to cater for differences in learning to facilitate students to work with teachers to select learning goals and objectives based on authentic problems and students' prior knowledge, interests and experience. Teachers in primary schools continued to prescribe learning goals and objectives based on prior experiences, past practices, and state mandated standards for students to follow.

One of the major reasons behind this situation is the unchanged student assessment scheme in Hong Kong primary schools. In a learner-centred approach where the learning paths and learning outcomes which may involve different interdisciplinary information and knowledge for individual students, assessment methods can be based on formative approach as well as a summative approach. Formative assessment needs to be used to support students to become better independent learners and improve their achievement attainment by self and peer assessment (Shepard, 2000). In Hong Kong, however, teachers in primary schools continued to 'teach to the test' in preparation for summative 'high stakes' examinations at the end of the primary phase. Nearly 90% of principals perceived that preparation for examinations was still a paramount consideration.

Achievement of the Second Vision – link up students with the vast network world of knowledge

IT can enable students to access multiple resources in a learner-centred approach whereas information is solely selected and prepared by teachers in a teacher-centred approach. In this study, there was evidence that some students were handicapped by limited access to IT resources due to financial problem or language ability.

Furthermore, some schools were not well-prepared for the implementation of the ITEd Strategy due to the limitation of their physical schools environment.

In contrast, some students had access to multiple resources which included multi-media courseware developed by the commercial sector, electronic materials developed by teachers and open resources in the internet. However, the majority of the teachers did not work with the students to determine the learning strategy to meet the needs of individual students in a learner-centred approach. In terms of actual IT use, the SAMS designed and implemented by the ED for communication purposes was the major application of IT. In other aspects of IT, where schools had freedom to decide both the type and level of use, the use of IT was mostly as a tool only and IT was often used to support direct teaching rather than facilitate learning.

Achievement of the Third Vision – students can process information effectively and efficiently

An important finding was that the primary students were still at the beginning stage of learning using IT. They leant IT skills in schools and thus developed a basic ability to operate computers. Many were able to access a wider range of information but often resorted to copying rather than selecting appropriate information when using the internet. Most of them could not process the interdisciplinary information and knowledge efficiently and effectively, and thus could not develop higher order thinking skills.

Achievement of the Fourth Vision – students can develop an independent life-long learning capability

The major use of IT by students had remained at the stage of studying IT as a subject and using it as a tool. This contradicts the expectation of the Government that the students may use IT to acquire and process information effectively and efficiently, and in the long-term develop a life-long learning capability. The availability of a wider range of resources via the internet and the possibility of using email had motivated some students who had become more pro-active but there was little evidence of students being taught to 'learn how to learn' especially how to process information accessed via the internet. They did not take more responsibility for being active knowledge seekers who construct knowledge and meaning themselves in a learner-centred approach, and thus finally develop an attitude and capability for independent life-long learning.

6.3.2 Summary for Research Question Two: How Far Have the Policy's Central Components Contributed to Its Success?

Arguably, the government had provided a broad strategic direction for the schools in the form of the identification of four visions and four components. What appeared to be lacking was detailed central guidance which included targets and success criteria. The '*unclear and unspecified changes caused great anxiety and frustration to those sincerely trying to implement them*' (Fullan, 1991, p.70). Central co-ordination to assist the schools with the implementation of the strategy was also lacking, for instance in providing help for purchasing IT services. Whilst the government provided significant funding for IT facilities, arrangements for the way in which funding was made available to schools were criticised by the principals who preferred continuous rather than a 'one off' injection of funds which made it more difficult for them to plan ahead. Principals were often highly critical of the quantity and quality of 'technical support' provided. They were also very critical of the quality of the professional development programmes for teachers which were felt to be irrelevant, often focussing on technical skills rather than IT pedagogical skills, poorly timed and insufficiently differentiated. Since the change in curriculum to facilitate the implementation of the ITEd Strategy was limited, teachers continued to teach accordingly to the original syllabus. Involvement from the community in the ITEd Strategy was rare.

6.3.3 Summary for Research Question Three: To What Extent Was the Meeting of Objectives in Individual Schools Related to Specific School Characteristics?

The study found that the type of school was not a factor which had contributed to the success of the implementation of the ITEd Strategy. In contrast, it was found that school age, school size, previous IT experience, the size and layout of the classrooms in the schools had affected the success of implementation of the ITEd Strategy in individual schools.

6.3.4 Summary for Research Question Four: What Other Factors have Helped or Hindered Teachers in School to Implement ITEd Strategy?

It is clear that there was some tension between the formulation of the strategy by the government and its implementation in the primary schools investigated. The ITEd Strategy was presented by the government as an initiative to which schools were

expected to respond but were given some freedom to decide on how they implemented the policy as a consequence of the principle of delegation. The successful implementation of the ITEd Strategy entailed the management of a significant and challenging pedagogical change which depended on co-operation between the government and the school principals. It is interesting to speculate whether the government had fully understood the extent of the pedagogical challenge implied by the intended paradigm shift.

Decisions made by principals were influenced by the organisational principles which included their commitments and values and attitudes to the imposed change and the principle of delegation. Though more than half were supportive of the IT visions, others questioned whether the strategy was needed at that time with other priorities such as student recruitment in a situation of falling birth-rate. There were also conflicting views on why the policy was needed. There was evidence that some principals felt that the rationale for them implementing the strategy was mainly related to external factors. This was confirmed by statements such as '*instructed by Government*', '*attract high-quality students*' and '*parents' expectation*', rather than considering the intended benefits promoted in government guidance such as '*innovative teaching and learning method*', '*save manpower and resource*' and '*encourage global contact*'.

Whittaker (1993) argued that although education policies are typically initiated by Government, changes in educational practice still, have to come from practitioners themselves, rather than through regulation. Principals were required to act as intermediaries between the government and their own teachers to support them to achieve a very substantial paradigm shift in teaching and learning approaches with the potential for resistance from classroom practitioners. In planning for the intended paradigm shift, principals were faced with a variety of reservations/anxieties about the use of IT and the readiness of their staff for the IT pedagogical challenge.

Morrison (1998) identified several barriers to change which affected the implementation of the ITEd Strategy by the teachers: values barriers where the proposed change challenges established value systems; psychological barriers resulting in resistance to change because of a lack of confidence; and finally, practical barriers in which change is resisted when it threatens to deskill or involves substantial re-skilling or when resources are insufficient to support change.

In the case of values barriers to change, it was apparent that some teachers were

perceived to have significant reservations about the use of IT. There was clearly an enduring belief in direct teaching based on a transmission theory of learning, rather than facilitating learning using a tutorial approach. Some teachers believed that IT was inappropriate for young children (Healey, 2005; Schmidt and Callahan, 1992; Drier, 2001).

In the case of psychological barriers to change, some teachers felt threatened by their inferior IT skills compared with their students. Others demonstrated a general lack of confidence using IT in the classroom (Schiller, 2003). Some felt threatened by the changed relationships between teacher and student in the classroom with a surrendering of some control to the students in tutorial situations (Tiene and Ingram, 2001).

In the case of practical barriers, investment required to re-skill teachers was a daunting prospect. Faced with a host of tasks, many teachers were perceived to have insufficient time and skill to incorporate IT in teaching and learning. These teachers could not fully utilise the potential of IT. Computer knowledge and skill is, in Hong Kong as in other areas, insufficient in itself to ensure that teachers will make use of computers in their teaching (Thomas, Tyrrell and Bullock, 1996).

Teachers were also faced with inadequacies in IT facilities. These included classrooms which were too cramped to house several computers thus limiting the scope for interactive and collaborative work and a shortage of appropriate software in Chinese which was the medium of instruction in the majority of schools.

6.4 The Implications of the Findings

The implications of the ITEd Strategy for the Government, schools, principals, teachers and students will be presented in this section.

Engaging the Frontline Operators

In the study, it was found that the tension between the policy formulation and the policy implementation stage of the ITEd Strategy was considerable. From the viewpoint of principals' in the primary schools, the Government had not fully anticipated the implications of the ITEd Strategy. The issues included the competency level of principals and teachers, the availability of resources involved and the technical support required. Inadequacies in these areas resulted in some resistance and

difficulties in the implementation stage at the school level. So, in the future, the HKSAR may invite representatives from principals, teachers, parents, students and commercial sectors, etc. to become involved in the policy re-formulation stage. By doing this, opinions and concerns of frontline operators can be reflected and objections to the ITEd Strategy from the school level can to some extent be eliminated.

Providing Support for Principals and Teachers

Ball and Bowe (1992) argued that during the process of change, principals and teachers always feel stressed, under pressure and experience overloading. It was indicated clearly in the study that principals and teachers were under pressure from education reform and they felt frustrated. HKSAR may try to support them with more resources in order to release them from their heavy workloads. Teaching assistants with appropriate information technology knowledge and skill can be supplied to schools to help teachers develop courseware in the ITEd Strategy. In order to ensure success, the Government may strengthen the technical support services in schools and provide maintenance services for the computer equipment in schools as well. It is also important that the Government may assist schools to review and continue to strengthen the capacity of the team of teachers responsible for the planning and implementation of IT in schools by providing exemplars, guidance notes and practical advice on various topics, such as using IT for school administration and management.

Providing Professional Training for Principals

It is suggested that in order to further develop the IT in primary education policy, appropriate training or support may be considered by the Government for the principals. Alternatively, as suggested by the principals, some new higher-rank permanent positions may be set up in schools to be in charge of the implementation of the ITEd Strategy. By doing this, the principals can delegate the heavy workload related to IT implementation to these professional colleagues.

Challenging the Attitude of Teachers and Students to the Use of IT in the Classroom

The narrow attitude of some teachers and students to using IT in education may be challenged. Efforts may be spent on educating teachers and students to view IT from a broader perspective. IT should not be used only as a tool and as a separate learning subject. It may be used to support teaching and learning in wider ways. In fact,

technology integration skills cannot be learned sitting passively in a classroom, listening to an instructor, or watching demonstrations. Teachers must have an opportunity to navigate through a programme and complete a set of steps to create a new product. The focus of professional development may be in classrooms, rather than just technical skills. Some principals in the study also suggested that on-going training may be provided to develop the attitude and skills of teachers and students to use computers effectively in teaching and learning.

Providing Improved Professional Development Programmes for Teachers

The principals suggested that more IT training may be provided for teachers, particularly in the area of application of IT in teaching and learning, rather than just the acquisition of technical skill. There was also a suggestion that technical support staff be provided with IT pedagogy training.

Promoting a Sharing Culture

A sharing culture may be promoted amongst schools, teachers and students. Research has indicated that teachers need to interact with other teachers to share needs, successes and to help each other out of problems arising from the struggle with IT in school (Soloway, 1996). In order to encourage teachers to build up a culture of sharing with others, the government can set up an on-line central database to collect materials from all teachers and a mechanism can be created for them to exchange materials from the database. The depository of the teaching materials may be organised and structured, and practical advice on how to integrate these resources into daily teaching and learning may be provided. By adopting this approach, students and teachers may be able to obtain better results through collaborative learning (Forcheri and Molfino, 2000), i.e. connect with each other, learn flexibly, and collaborate with others in the world.

Providing a more equitable distribution of IT Facilities

The study repeatedly indicated those students coming from poorer families were not helped by their lack of access to computing facilities. This included students who had come to Hong Kong from mainland China. In addition, schools varied widely in the extent to which they could devote funding to IT facilities. Furthermore, there was evidence that the Government had not considered the negative influences such as computer criminals to students.

Reviewing the Use of Chinese as the Medium of Instruction

In the study, it was found that the language of instruction was one of the factors that created difficulties for the supply of relevant courseware. In fact, some students are quite confused with the three spoken languages – Cantonese (the dialect in Hong Kong and Southern China), Mandarin (the official national language in Mainland China) and English which they are required to use in schools in Hong Kong. It is generally agreed that the development of a range of suitable educational software can be treated as a high priority to embark on IT (Johnson and Samways, 1993). So, the HKSAR may review the impact of promoting the use of Chinese as medium of instruction on the ITEd Strategy, because most of the good quality courseware is in the form of English. The Government may consider subsidising commercial sectors or tertiary institutes to develop courseware tailored for the needs of primary schools in Hong Kong.

Improving the School Environment

Due to limited space and the building design of some old schools, the accommodation of IT facilities in these schools is relatively difficult. The physical size and settings of the classrooms, number of teachers and students, existing wiring connection technology, etc. are some of the limitations faced by these old schools. HKSAR may consider some improvement in these old schools to facilitate the implementation of the strategy. Re-developing the campus of the old schools is one means while suggesting the wireless technology to these schools to help remove the physical barrier of learning in classroom and to promote the concept of an e-campus is another possible method.

Identifying a Strategy for Cultural Change

HKSAR may review the strategy for achieving the Community-wide Culture. The exchange of knowledge and interaction between different parties may be able to help the development of any new strategy. If the tertiary institutions, community bodies, business communities and parents can be involved actively in the implementation of the ITEd Strategy, the impact can be improved. Specifically, home-school co-operation may be developed further and facilitated through the use of IT. However, it has been shown in the study that parents are generally lacking in appropriate knowledge and skills to assist the schools in this aspect. With IT, schools may keep

parents closely informed of students' behaviour and learning progress. So, parents may be trained and encouraged to act as supporters and motivators for their children to understand the ethical, legal and health issues involved in using IT.

Devising IT Implementation Plans

It is apparent out that there are different considerations in planning for the adoption of change such as the relevance of change, readiness for the change, and resources needed to implement the change (Fullan, 1991, p.63). The importance of taking multiple perspectives into account is similarly endorsed by Apple's view that in order to understand the role of ideology, and the state in educational policy, it is necessary to:

> *'focus on what actually happens in schools, on the agency of teachers and students, on how policies are actually made in the political area, and on what the contradicting tensions are in the reality of schools' (Apple, 1989, p.2).*

In the study, it has been shown that some schools did not have experts in the area of IT in education. It is reported that in other areas of the world, teachers' lack confidence in their ability to use computers effectively which makes it difficult to integrate IT into the daily activities of the school (Schiller, 2003). Therefore, it would be helpful if the HK Government could give continuous support such as allocation of teams of consultants to individual schools to assist in carrying out the new policy.

6.5 Limitations of the Research

This is a cross-sectional study, and the data collected represents the situation at the time of completing the questionnaire and interviews. Arguably this study is worthwhile. Fung (1995) has argued for the importance of continuous evaluation and monitoring procedures in managing educational change. However, it is necessary to be cautious in generalizing the results obtained in this study and linking them to the future of IT in Hong Kong primary schools. More sources of evidence can be collected and compared in order to determine the accuracy of information or phenomena and to establish its validity.

It is also worth paying attention to the behaviour of the non-respondents to the survey and the sample not being selected for the interviews. The lower the participation rate to a research study, the greater the likelihood that those who responded are

significantly unlike to those who did not, and so the greater the risk of systematic bias in the research results. In this study, although the whole population of primary school principals were targeted for the survey, there were still a large number of principals who did not reply to the survey questionnaire; the response rate to the questionnaire survey was 18.0%. By the same token, there were only 12 principals randomly selected for the semi-structured interviews. If resources were available, follow-up with survey non-respondents and more interviews could be arranged to reduce the potential bias and improve the accuracy of the results.

6.6 Suggestions for Further Research

One single EdD research project is by nature restricted to what can be accomplished in few years time. As an individual researcher, the current study already requires a significant amount of time and effort. The validity and reliability of the research can definitely be improved if more resources can be provided.

Furthermore, if the HKSAR Government takes into consideration the recommendations made in this study, it may result in enormous changes in the policy, people and culture of the ITEd Strategy in primary schools. It would require significant community-wide consultation in order to gauge the broad spectrum of opinions and to produce a road map for the way forward.

From the experience of this study, it is recommended that the further triangulation of data collection may be taken into consideration, if the situation is to be investigated further.

Methodological Triangulation

Given the constraints of time and finance on this study, the most the present study could do was to report schools' principal perceptions of change by using a survey questionnaire and semi-structured interview in this area. However, there is a chance that some respondents may not tell the truth due to many possible reasons such as political considerations. If resources were allowed, more data collection methods could be used to establish different views of the phenomena. For example, some small samples could be selected and looked at in depth or over time. By observing them in their everyday work, it might be possible to check they actually do what they say they do. This could help to understand what was happening inside and hopefully the recommendations to the Government could be more thorough and valid.

Respondent Triangulation

Triangulation can also be achieved by asking the same questions of many different participants within a method.

In this study, the school principal completed the questionnaire and some were interviewed. This may not truly reflect the situation, as there may be bias for whatever reason, such as their personal interest, and the answer to the questionnaire may not be accurate. If the study had included a wider range of stakeholders such as officers of Education and Manpower Bureau, teachers, students and parents etc., it would have made possible a more complete and comprehensive view of the strategy. For example, if the questionnaire had been divided into two separate sections, one completed by the school principal to obtain the view from school management of the ITEd Strategy and the other one by ordinary teachers of their direct feelings, the result may have been more accurate.

6.7 Concluding Comments

This study concluded that '*the ITEd Strategy has not been implemented successfully in primary schools to achieve its desired outcomes of a paradigm shift from a largely textbook-based teacher-oriented approach to a more interactive and learner-centred approach'*. The findings showed that the core problem was not in the information technology policy itself. The principals expressed considerable support for the strategy and believed that IT could facilitate the paradigm shift, although some of them may not have fully understood the potential of IT to enhance learning. However, in reality, they repeatedly pointed out there were considerable problems such as financial arrangement, teacher enablement, technical resources, etc. in the implementation stage of the ITEd Strategy. So, it is by no means the case that IT is incapable of facilitating a paradigm shift in teaching and learning. All that can be said is that the implementation of the ITEd Strategy has not achieved the paradigm shift.

This research is set in the context of the rapid development of information and communication technologies and the significant impact they are having on teaching and learning in primary education. The study demonstrated that the impact of government action in directing schools' practice is so great that it outweighs the other drivers in the policy formulation stage. However, in the policy implementation stage, the strong barriers at the school level have resisted the successful integration of IT

into primary school life. In order to make the IT strategy more successful, the government may seek some ways for the schools to override the above barriers. It is hoped that in the near future, according to the former Chief Executive of the HKSAR, Hong Kong will indeed become *"a leader, not a follower, in the information world of tomorrow"* (HKSAR, 1998)!

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Appendix 1 Teacher-centred and Learner-centred Approaches (Hirumi, 2002)

	Teacher-Centred Approach	Learner-Centred Approach
Learning Outcomes	• Discipline-specific verbal information. • Lower order thinking skills, e.g. recall, identify, define. • Memorisation of abstract and isolated facts, figures and formulas.	• Interdisciplinary information and knowledge. • Higher order thinking skills, e.g. problem-solving. • Information processing skills, e.g. access, organise, interpret, communicate information.
Goals and Objectives	• Teacher prescribes learning goals and objectives based on prior experiences, past practices, and state and/or locally mandated standards.	• Students work with teachers to select learning goals and objectives based on authentic problems and students' prior knowledge, interests and experience.
Instructional Strategy	• Instructional strategy prescribed by teacher. • Group-paced, designed for 'average' student. • Information organised and presented primarily by teacher, e.g. lectures, with some supplemental reading assignments.	• Teacher works with students to determine learning strategy. • Self-paced, designed to meet needs of individual student. • Student given direct access to multiple sources of information, e.g. books, online databases, community members.
Assessment	• Assessment used to sort students. • Paper and pencil exams used to assess students acquisition of information. • Teacher sets performance criteria for students. • Students left to find out what teacher wants.	• Assessment is integral part of learning. • Performance based, used to assess students ability to apply knowledge. • Students work with teachers to define performance criteria. • Students develop self-assessment and peer assessment skills.
Teacher's Role	• Teacher organises and presents information to groups of students. • Teachers act as gatekeeper of knowledge, controlling students' access to information. • Teacher directs learning.	• Teacher provides multiple means of accessing information. • Teacher acts as facilitator, helps students access and process information. • Teacher facilitates learning.
Student's Role	• Students expect teachers to teach them what's required to pass the test. • Passive recipients of information. • Reconstructs knowledge and information.	• Students take responsibility for learning. • Active knowledge seekers. • Construct knowledge and meaning.
Learning Environment	• Students sit in rows. • Information presented via lectures, books and films.	• Students work at stations with access to multiple resources. • Students work individually at times but also need to collaborate in small groups.

Appendix 2 Survey Questionnaire (for Pre-testing)

20 July 2007

Dear Principal,

I am a student of University of Leister studying the Doctorate Degree in Education. I am currently doing a research study on assessing the effectiveness of the policy and evaluating the process of the implementation of the Five-Year (1998/2003) IT in Education (ITEd) Strategy in primary schools of Hong Kong. The enclosed questionnaire is designed to obtain your views on this matter. I am confident that the findings will contribute to the development of IT in Hong Kong. A copy of the summary report of the results of this study will be provided to you afterwards.

We realize that your schedule is a busy one and that your time is valuable. Your responses will be kept completely confidential, there is no requirement to provide any identifying information on the questionnaire form.

The questionnaire takes approximately 15 to 20 minutes to complete. You may feel unable to answer all the questions yourself, but please feel free to consolidate with relevant colleagues where appropriate.

It is greatly appreciated if you will complete the questionnaire and return it by 25 July 2007 by fax number 2319 0984. Alternatively, you can return it by email at derek@cps.com.hk or by post to Suite 417, 4/F, InnoCentre, 72 Tat Chee Avenue, Kowloon Tong, Kowloon.

Should you have any query about this questionnaire, please feel free to contact me at 9228 1370.

Thank you in advance for your cooperation.

Derek Chow

(Derek Chow)

Questionnaire

Thank you for agreeing to complete this questionnaire – the result from this survey will be extremely useful in helping to shape the future development of IT in education, and determining the types of support that schools may need to have.

All information in this questionnaire will remain strictly confidential. The questions are hopefully easy to complete, however, if you are unable to answer any question, please just pass on to the next. In some cases a definite answer may be difficult to ascertain – in these cases could you please estimate the answer rather than leaving it blank.

Thank you for your co-operation.

Background Information

1. Name of School _____ (optional)

2. Details of the school

Type of school	Government	□	Aided	□	Private	□	Direct Subsidy □
Age of school	0-10 years	□	11-20 years	□	21-30 years	□	> 30 years □

3. Total number of

Teaching staff _____ Supporting staff _____ Students _____

4. In your opinion, the level of maturity of your school in adopting IT in Education is

- ☐ Level 1: Initial (ad-hoc and do not have a stable environment for ITEd)
- ☐ Level 2: Repeatable (the necessary process discipline is in place to repeat earlier successes with similar nature)
- ☐ Level 3: Defined (processes are well characterized and understood, and are described in standards, procedures, tools, and methods)
- ☐ Level 4: Managed (management can identify ways to adjust and adapt the process to particular aspects)
- ☐ Level 5: Optimizing (continually improving process performance through both incremental and innovative technological improvements)

5. How long have you been in this school? _____ Years

Visions of the 5-year ITEd Strategy (1998-2003)

After the ITEd Strategy has been implemented in your school,…

		Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
6.	Your school become a more dynamic institution	□	□	□	□	□
7.	Your school become a more innovative institution	□	□	□	□	□
8.	Students become more motivated in learning	□	□	□	□	□
9.	Students become more inquisitive in learning	□	□	□	□	□

10.	Students become more creative in learning	□	□	□	□	□
11.	Students have been linked up with the vast network world of knowledge and information	□	□	□	□	□
12.	Students have been enabled to acquire a broad knowledge base and a global outlook	□	□	□	□	□
13.	Students capabilities to process information effectively have been developed	□	□	□	□	□
14.	Students capabilities to process information efficiently have been developed	□	□	□	□	□
15.	Attitudes of students for independent life-long learning have been developed	□	□	□	□	□
16.	Capability of students for independent life-long learning have been developed	□	□	□	□	□

Access and Connectivity

		Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
17.	Number of computers is enough	□	□	□	□	□
18.	Utilization rate of the computers is high	□	□	□	□	□
19.	Number of computers which can access internet is sufficient	□	□	□	□	□
20.	Utilization rate of the internet connected computers is high	□	□	□	□	□

Teacher Enablement

		Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
21.	Teacher Training is useful in helping teachers to incorporate IT in education	□	□	□	□	□
22.	Current skills of Teachers is enough to incorporate IT in education	□	□	□	□	□

Curriculum and Resource Support

		Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
23.	Curriculum and Resource Support from EMB is enough	□	□	□	□	□
24.	Teachers frequently visit the Information Technology Education Resource Centre	□	□	□	□	□

Community-wide Culture

		Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
25.	EMB actively involved in IT in education of your school	□	□	□	□	□
26.	Principal actively involved in IT in education of your school	□	□	□	□	□
27.	Teachers actively involved in IT in education of your school	□	□	□	□	□
28.	Students actively involved in IT in education of your school	□	□	□	□	□

29.	Tertiary Institutions actively involved in IT in education of your school	□	□	□	□	□
30.	Business Community actively involved in IT in education of your school	□	□	□	□	□
31.	Community Bodies actively involved in IT in education of your school	□	□	□	□	□
32.	Parents actively involved in IT in education of your school	□	□	□	□	□

33. Which of the following is the most important stakeholder to encourage and facilitating the incorporating of IT in education

EMB	□	Principal	□	Teachers	□	Students	□
Community bodies	□	Tertiary institutions	□	Business Community	□	Parents	□

Purposes, Impact and Future Development of IT in Education

34. What is the major reason(s) for implementing IT in education in your school? (may choose more than one)

Instructed by Government	□	Attract high-quality students	□
Save manpower and resource	□	Innovative teaching and learning method	□
Encourage global contact	□	Don't know	□
Others (please specify)	□	_____	

35. What are the reasons for the teachers not using IT in teaching and learning? (may choose more than one)

Not enough skill	□	Not enough courseware	□
Not enough time to develop the courseware	□	Not enough funding	□
Not enough facilities	□	Not enough technical support	□
Others (please specify)	□	_____	

36. Which subject(s) do your school incorporate IT in the teaching and learning? (may choose more than one)

Chinese	□	English	□	Mathematics	□	General Studies	□	Computer	□
Religion	□	Art	□	Music	□	Physical Education	□	Cross-curricular	□
Others (please specify)		□	_____						

37. What is the major role of computer in the teaching and learning process in your school?

As a tutor (by performing teaching role)	□
As a tool (similar to pen, typewriter, etc.)	□
As a tutee (the user teach the computer to do something)	□
Others (please specify)	
_____	□
_____	□

38. What change(s) in the teaching approach of those teachers after using IT are you aware of? (may choose more than one)

From teacher-centred to student-centred	□	From knowledge-based to "learning to learn"	□
From unidirectional to bi-directional	□	From examination-oriented to project-oriented	□
From textbook oriented to open-knowledge oriented	□	Nothing change	□
Others (please specify)	□	_____	

39. Besides teaching and learning, for what other reasons does your school use IT? (may choose more than one)

School Administration and Management System (SAMS)	□	Internal communication	□
Courseware development	□	External communication	□
Resource Management	□	School-based curriculum development	□
School Extra-Curricular Activities	□		
Others (please specify)	□	_____	

40. What do you feel are your student's dominant view about the use of IT for learning?

Learn about IT (e.g. learning IT skills such as word-processing, spreadsheet)	□
Learn from IT (e.g. learning other subject matter from using IT)	□
Learn with IT (e.g. accompany learning with the using of IT)	□
Manage learning with IT (e.g. assist learning progress, schedule etc by using IT)	□

41. In your experience, are the following situations improved after using IT in education?

	Much Improved	Improved	No change	Deteriorated	Much Deteriorated
Students' understandings of the teaching materials	□	□	□	□	□
Students' test and examination results	□	□	□	□	□

42. Please indicate your level of support for the following key objectives of the ITEd Strategy?

	Strongly Support	Support	Neither	Un-support	Strongly Un-Support
To turn our schools into dynamic and innovative learning institutions where students can become more motivated, inquisitive and creative learners	□	□	□	□	□
To link up our students with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global outlook	□	□	□	□	□
To develop in our students capabilities to process information effectively and efficiently	□	□	□	□	□
To develop in our students the attitude and capability for independent life-long learning	□	□	□	□	□

43. Do you agree that the process of ITEd policy implementation in your school is success?

Strongly Agree	Agree	Neither	Strongly Disagree	Disagree
□	□	□	□	□

44. What do you see as the strengths of the ITEd policy?

_____

_____

_____

45. What do you see as the weaknesses of the ITEd policy?

_____

_____

_____

46. What do you believe should do now to ensure the future development of IT education in the primary schools?

_____

_____

_____

Other opinions

Please fill in any other opinions/comments/suggestions about IT in education in general

Thank you for taking time to provide this information to us. If you would like to obtain the summarized survey report in the future, please tick this box and provide a suitable contact name, telephone number and email address.

□ **Contact:** _____ **Tel:** _____ **Email:** _____

Appendix 3 Survey Questionnaire (for Pilot Survey)

13 August 2007

Dear Principal,

I am a student of University of Leicester studying the Doctorate Degree in Education. I am currently doing a research study on assessing the effectiveness of the policy and evaluating the process of the implementation of the Five-Year (1998/2003) IT in Education (ITEd) Strategy in primary schools of Hong Kong. The enclosed questionnaire is designed to obtain your views on this matter. I am confident that the findings will contribute to the development of IT in Hong Kong. A copy of the summary report of the results of this study will be provided to you afterwards.

I realize that your schedule is a busy one and that your time is valuable. Your responses will be kept completely confidential, there is no requirement to provide any identifying information on the questionnaire form.

The questionnaire takes approximately 15 to 20 minutes to complete. You may feel unable to answer all the questions yourself, but please feel free to consolidate with relevant colleagues where appropriate.

It is greatly appreciated if you will complete the questionnaire and return it by 17 August 2007 by fax number 2319 0984. Alternatively, you can return it by email at derek@cps.com.hk or by post to Suite 417, 4/F, InnoCentre, 72 Tat Chee Avenue, Kowloon Tong, Kowloon.

Should you have any query about this questionnaire, please feel free to contact me at 9228 1370.

Thank you in advance for your cooperation.

Derek Chow

(Derek Chow)

Questionnaire

Thank you for agreeing to complete this questionnaire – the result from this survey will be extremely useful in helping to shape the future development of IT in education, and determining the types of support that schools may need to have.

All information in this questionnaire will remain strictly confidential. The questions are hopefully easy to complete, however, if you are unable to answer any question, please just pass on to the next. In some cases a definite answer may be difficult to ascertain – in these cases could you please estimate the answer rather than leaving it blank.

Thank you for your co-operation.

Background Information

1. Details of your school

Type of school	Government □	Aided □	Private □	Direct Subsidy □
Age of school	0-10 years □	11-20 years □	21-30 years □	> 30 years □
Size of school	No. of teaching staff _____	No. of supporting staff _____	No. of students _____	

2. How long have you been in this school? _____ Years

3. How long have your school adopted IT in education? _____ Years

Visions of the 5-year ITEd Strategy (1998-2003)

After the ITEd Strategy has been implemented in your school, …

		Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
4.	Your school become a more dynamic institution	□	□	□	□	□
5.	Your school become a more innovative institution	□	□	□	□	□
6.	Students become more motivated in learning	□	□	□	□	□
7.	Students become more inquisitive in learning	□	□	□	□	□
8.	Students become more creative in learning	□	□	□	□	□
9.	Students have been linked up with the vast network world of knowledge and information	□	□	□	□	□
10.	Students have been enabled to acquire a broad knowledge base and a global outlook	□	□	□	□	□
11.	Students capabilities to process information effectively have been developed	□	□	□	□	□
12.	Students capabilities to process information efficiently have been developed	□	□	□	□	□
13.	Attitudes of students for independent life-long learning have been developed	□	□	□	□	□
14.	Capability of students for independent life-long learning have been developed	□	□	□	□	□

Central components of the ITEd Strategy

Considering the central components of the ITEd Strategy, …

		Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
15.	Number of computers is sufficient	□	□	□	□	□
16.	Utilization rate of the computers is high	□	□	□	□	□
17.	Number of computers which can access internet is sufficient	□	□	□	□	□
18.	Utilization rate of the internet connected computers is high	□	□	□	□	□
19.	Teacher Training is useful in helping teachers to incorporate IT in education	□	□	□	□	□
20.	Skills of Teachers is sufficient to incorporate IT in education	□	□	□	□	□
21.	Curriculum and Resource Support from EMB is sufficient	□	□	□	□	□
22.	Teachers frequently visit the Information Technology Education Resource Centre	□	□	□	□	□
23.	EMB actively involved in IT in education of your school	□	□	□	□	□
24.	Principal actively involved in IT in education of your school	□	□	□	□	□
25.	Teachers actively involved in IT in education of your school	□	□	□	□	□
26.	Students actively involved in IT in education of your school	□	□	□	□	□
27.	Tertiary Institutions actively involved in IT in education of your school	□	□	□	□	□
28.	Business Community actively involved in IT in education of your school	□	□	□	□	□
29.	Community Bodies actively involved in IT in education of your school	□	□	□	□	□
30.	Parents actively involved in IT in education of your school	□	□	□	□	□

Purposes, Impact and Future Development of IT in Education

31. What is the major reason(s) for implementing IT in education in your school? (may choose more than one)

Instructed by Government	□	Attract high-quality students	□
Save manpower and resource	□	Innovative teaching and learning method	□
Encourage global contact	□	Don't know	□
Others (please specify)	□	_____	

32. What is the major reason(s) for the teachers not using IT in teaching and learning? (may choose more than one)

Insufficient skill	□	Insufficient courseware	□
Insufficient time to develop the courseware	□	Insufficient funding	□
Insufficient facilities	□	Insufficient technical support	□
Others (please specify)	□	_____	

33. What change(s) in the teaching approach of those teachers after using IT are you aware of? (may choose more than one)

From teacher-centred to student-centred	□	From knowledge-based to "learning to learn"	□
From unidirectional to bi-directional	□	From examination-oriented to project-oriented	□
From textbook oriented to open-knowledge oriented	□	Nothing change	□
Others (please specify)	□	_____	

34. What is the major purpose(s) does your school use IT? (may choose more than one)

Teaching and Learning	□	Internal communication	□
Courseware development	□	External communication	□
Resource Management	□	School-based curriculum development	□
School Extra-Curricular Activities	□	School Administration and Management System (SAMS)	□
Others (please specify)	□	_____	

35. What do you feel are your student's dominant view about the use of IT for learning?

Learn about IT (e.g. learning IT skills such as word-processing, spreadsheet)	□
Learn from IT (e.g. learning other subject matter from using IT)	□
Learn with IT (e.g. accompany learning with the using of IT)	□
Manage learning with IT (e.g. assist learning progress, schedule etc by using IT)	□

36. In your experience, are the following situations improved after using IT in education?

	Much Improved	Improved	No change	Deteriorated	Much Deteriorated
Students' understandings of the teaching materials	□	□	□	□	□
Students' test and examination results	□	□	□	□	□

37. Please indicate your level of support for the following key objectives of the ITEd Strategy.

	Strongly Support	Support	Neither	Un-support	Strongly Un-Support
To turn our schools into dynamic and innovative learning institutions where students can become more motivated, inquisitive and creative learners	□	□	□	□	□
To link up our students with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global outlook	□	□	□	□	□
To develop in our students capabilities to process information effectively and efficiently	□	□	□	□	□
To develop in our students the attitude and capability for independent life-long learning	□	□	□	□	□

38. Do you agree with the following aspects about the process of ITEd policy implementation in your school?

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
You are well-informed on the operation details of the policy	□	□	□	□	□
You have sufficient support to implement the policy	□	□	□	□	□
The process of ITEd policy implementation is success	□	□	□	□	□

39. In your opinion, the current level of maturity of your school in adopting IT in Education is

- □ Level 1: Initial (ad-hoc and do not have a stable environment for ITEd)
- □ Level 2: Repeatable (the necessary process discipline is in place to repeat earlier successes with similar nature)
- □ Level 3: Defined (processes are well characterized and understood, and are described in standards, procedures, tools, and methods)
- □ Level 4: Managed (management can identify ways to adjust and adapt the process to particular aspects)
- □ Level 5: Optimizing (continually improving process performance through both incremental and innovative technological improvements)

40. What do you see as the strengths of the ITEd policy?

_____

_____

_____

41. What do you see as the weaknesses of the ITEd policy?

_____

_____

_____

42. What do you believe should do now to ensure the future development of IT education in the primary schools?

_____

_____

_____

Other opinions

Please fill in any other opinions/comments/suggestions about IT in education in general

Thank you for taking time to provide this information to us. If you would like to obtain the summarized survey report in the future, please tick this box and provide suitable contact details.

□ **Contact:** _____ **Tel:** _____ **Email:** _____

Name of School: _____

Appendix 4 Survey Questionnaire (Finalized English Version)

1 October 2007

Dear Principal,

I am a student of University of Leicester studying the Doctorate Degree in Education. I am currently doing a research study on assessing the long-term effectiveness of the policy and evaluating the process of the implementation of the IT in Education (ITEd) Strategy in primary schools of Hong Kong. The enclosed questionnaire is designed to obtain your views on this matter. I am confident that the findings will contribute to the development of IT in primary education in Hong Kong. A copy of the summary report of the results of this study can be provided to you afterwards.

The questionnaire takes ONLY approximately 15 to 20 minutes to complete. Please feel free to consolidate the information with relevant colleagues where appropriate. You are not required to provide any identifying information on the questionnaire form and your responses will be kept completely confidential.

It is greatly appreciated if you will complete the questionnaire and return it by 10 October 2007 by fax number 2319 0984. Alternatively, you can return it by email at derek@cps.com.hk or by post to Suite 417, 4/F, InnoCentre, 72 Tat Chee Avenue, Kowloon Tong, Kowloon.

Should you have any query about this questionnaire, please feel free to contact me at 9228 1370.

Thank you in advance for your cooperation.

Derek Chow

(Derek Chow)

Questionnaire

Thank you for agreeing to complete this questionnaire – the result from this survey will be extremely useful in helping to shape the future development of IT in education, and determining the types of support that schools may need to have.
All information in this questionnaire will remain strictly confidential. The questions are hopefully easy to complete; however, in some cases a definite answer may be difficult to ascertain – in these cases could you please estimate the answer rather than leaving it blank.

Thank you for your co-operation.

Background Information

1. Type of school	Government ☐	Aided ☐	Direct subsidy ☐
2. Age of school	_____ years		
3. Size of school	No. of teachers _____	No. of students _____	
4. Number of Years your school has adopted the IT in Education	_____ years		

Visions of the ITEd Strategy

5. After the ITEd Strategy has been implemented in your school, …

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
(a) your school has turned into a dynamic and innovative institution where students become more motivated, inquisitive and creative learners					
(b) your students has linked up with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global outlook					
(c) your students has developed capabilities to process information effectively and efficiently					
(d) your students has developed the attitude and capability for independent life-long learning					

Central components of the ITEd Strategy

6. Considering the contribution of the central components of the ITEd Strategy to its success in your school, …

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
(a) adequate IT facilities, including network facilities, for your students and teachers to enable them to assess information has been provided					
(b) key players in the school system to take up the challenges of their respective new roles have been encouraged					
(c) necessary curriculum and resource support for integration of IT into school education has been meaningfully provided					
(d) the emergence of a community-wide environment conducive to the culture change has been fostered					

Factors affecting teachers in school to implement the ITEd Strategy

7. What is the major reason(s) for the teachers to implement IT in education in your school? (may select up to 3 choices)

Instructed by Government	☐	Attract high-quality students	☐
Save manpower and resource	☐	Innovative teaching and learning method	☐
Encourage global contact	☐	Parents' expectation	☐
Others (please specify)	☐	_____	

8. What is the major reason(s) for the teachers not implement IT in education in your school? (may select up to 3 choices)

Insufficient skill	☐	Insufficient courseware	☐
Insufficient time to develop the courseware	☐	Insufficient funding	☐
Insufficient facilities	☐	Insufficient technical support	☐
Others (please specify)	☐	_____	

9. What is the major purpose(s) does your school use IT? (may select up to 3 choices)

Teaching and learning	☐	Courseware development	☐
Internal communication	☐	External communication	☐
Resource management	☐	School-based curriculum development	☐
School extra-curricular activities	☐	School Administration and Management System (SAMS)	☐
Others (please specify)	☐	_____	

10. What change(s) in the teaching approach of those teachers after using IT are you aware of? (may select up to 3 choices)

From teacher-centred to student-centred	☐	From knowledge-based to "learning to learn"	☐
From unidirectional to bi-directional	☐	From examination-oriented to project-oriented	☐
From textbook to open-knowledge oriented	☐	Nothing change	☐
Others (please specify)	☐	_____	

11. What do you feel are your student's dominant view about the use of IT for learning?

Learn about IT (e.g. learning IT skills such as word-processing, spreadsheet)	☐
Learn from IT (e.g. learning other subject matter from using IT)	☐
Learn with IT (e.g. accompany learning with the using of IT)	☐
Manage learning with IT (e.g. assist learning progress, schedule etc. by using IT)	☐

12. In your experience, are the following situations improved after using IT in education?

	Much Improved	Improved	No change	Deteriorated	Much Deteriorated
(a) Students' understandings of the teaching materials					
(b) Students' test and examination results					

13. Please indicate your level of support for the following key objectives of the ITEd Strategy.

	Strongly Support	Support	Neither	Not Support	Strongly Not Support
(a) To turn the school into a dynamic and innovative institution where students can become more motivated, inquisitive and creative learners					
(b) To link up the students with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global outlook					
(c) To develop in the students capabilities to process information effectively and efficiently					
(d) To develop in the student the attitude and capability for independent life-long learning					

14. Do you agree with the following aspects about the process of ITEd policy implementation in your school?

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
(a) You are well-informed on the operation details of the policy					
(b) You have sufficient support to implement the policy					
(c) The process of ITEd policy implementation is success					

15. Do you agree with the following claim?

"The ITEd policy has been implemented successfully in your school to achieve its desired outcomes of a paradigm shift from a largely textbook-based teacher-oriented approach to a more interactive and learner-centred approach."

Agree ☐ Disagree ☐ Don't know ☐

16. What do you see as the strengths of the ITEd policy?

_____

_____

_____

17. What do you see as the weaknesses of the ITEd policy?

_____

_____

_____

18. What should do now to ensure the future development of IT education in the primary schools?

_____

_____

_____

Other opinions/comments/suggestions about IT in education in general

Thank you for taking time to provide this information to us. If you would like to obtain the summarized survey report in the future, please tick this box and provide suitable contact details.

☐ **Contact:** _____ **Tel:** _____ **Email:** _____

Name of School: _____

Appendix 5 Survey Questionnaire (Finalized Chinese Version)

校長先生/女士：

本人是英國萊斯特大學教育學博士生，現正進行一項學術研究，評估於香港小學實行的「資訊科技教育計劃」的施行過程及成效。隨函附上本研究的問卷供閣下填寫。研究結果將對香港未來的小學資訊科技教育有著深遠的影響，研究總結更可於計劃完成後提供予閣下參考。

閣下只需 15 至 20 分鐘便可完成此份問卷。閣下可要求學校其他同事協助搜集相關資料。所有提供的資料將會保密處理。

完成問卷後，請於 2007 年 10 月 10 日或之前傳真回 2319 0984、電郵至 derek@cps.com.hk 或郵寄至九龍塘達之路 72 號創新中心 4 樓 417 室。

如對問卷有任何意見，請賜電 9228 1370 與本人聯絡。

多謝合作！

周曉強

(周曉強)
2007 年 10 月 1 日

問卷

多謝閣下協助填寫此份問卷 – 此研究的成果將有效地協助未來的資訊科技教育發展，並訂定學校需要的支援類別。
所有提供的資料將會保密處理。題目已以簡單易明爲主，如果在未能確定答案的情況下，請避免留空並盡量填上一個你認爲是最佳的答案。

多謝合作！

背景資料

1. 學校類別	官立 □	津貼 □	直資 □
2. 校齡	_____ 年		
3. 學校規模	教員數目 _____	學生數目 _____	
4. 學校已採用資訊科技教育的年期	_____ 年		

資訊科技教育策略的理想

5. 貴校於實施資訊科技教育策略後，・・・

	十分同意	同意	無意見	不同意	十分不同意
(a) 學校變爲充滿活力和創意的學習場所；而學生則成爲主動性強、具探究精神和創意的學習者					
(b) 學生有機會探索網上的知識和資訊世界，使他們獲得廣闊的知識基礎，並培養廣闊的世界觀					
(c) 學生培養了有效並迅速地處理資訊的能力					
(d) 學生培養了終生自學的態度和能力					

資訊科技教育策略的主要配套

6. 資訊科技教育策略的主要配套對於貴校・・・

	十分同意	同意	無意見	不同意	十分不同意
(a) 能提供足夠的資訊科技設施，包括網絡設施，讓學生和教師能夠接觸資訊					
(b) 能鼓勵學校體制內各主要成員面對新角色所帶來的挑戰					
(c) 能提供所需的課程和資源支援，使資訊科技的應用能有效地融入學校教育					
(d) 能建立有助改變學習文化的社會環境					

影響教師實行資訊科技教育的因素

7. 那些爲貴校教師於學校施行資訊科技教育的主要原因？ (可選最多 3 項)

根據政府要求	☐	吸引高質素學生	☐
節省人力及資源	☐	創新教學方法	☐
鼓勵學生接觸世界	☐	滿足家長期望	☐
其他 (請說明)	☐	_____	

8. 那些爲貴校教師不於學校施行資訊科技教育的主要原因？ (可選最多 3 項)

缺乏相關技能	☐	缺乏教學軟件	☐
缺乏時間開發教學軟件	☐	缺乏資金	☐
缺乏設施	☐	缺乏技術支援	☐
其他 (請說明)	☐	_____	

9. 那些爲貴校施行資訊科技教育的主要目的？ (可選最多 3 項)

教與學	☐	發展教學軟件	☐
內部通訊	☐	對外通訊	☐
資源管理	☐	校本課程發展	☐
學校課外活動	☐	學校行政及管理系統(SAMS)	☐
其他 (請說明)	☐	_____	

10. 當施行資訊科技教育後，貴校的教師於教學上有何改變？ (可選最多 3 項)

從教師爲中心變成學生爲中心	☐	從傳授知識變成傳授“學會學習”技巧	☐
從單向傳授變成雙向溝通	☐	從考試爲中心變成專題爲中心	☐
從傳授書本知識變成傳授公開知識	☐	沒有改變	☐
其他 (請說明)	☐	_____	

11. 貴校的學生怎樣應用資訊科技於學習？

學習資訊科技 (例如：文書處理、試算表軟件等)	☐
以資訊科技學習其他學科 (例如：利用資訊科技學習中文科)	☐
利用資訊科技輔助學習 (例如：利用資訊科技輔助中文科學習)	☐
利用資訊科技管理學習 (例如：利用資訊科技評估學習進度、制定時間表等)	☐

12. 根據閣下的經驗，以下的事項於施行資訊科技教育後有否改變？

	很大進步	進步	沒有改變	退步	很大退步
(a) 學生對教材的理解					
(b) 學生的測驗及考試成績					

13. 請表達閣下對資訊科技教育策略的看法。

	十分認同	認同	沒有意見	不認同	十分不認同
(a) 可使學校變爲充滿活力和創意的學習場所；而學生則成爲主動性強、具探究精神和創意的學習者					
(b) 可使學生有機會探索網上的知識和資訊世界，使他們獲得廣闊的知識基礎，並培養廣闊的世界觀					
(c) 可使學生培養有效並迅速地處理資訊的能力					
(d) 可使學生培養終生自學的態度和能力					

14. 閣下是否同意資訊科技教育策略於貴校實施時的以下各種情況？

	十分同意	同意	無意見	不同意	十分不同意
(a) 閣下清楚關於施行的細節					
(b) 閣下於施行策略時得到足夠支援					
(c) 施行策略的過程是成功的					

15. 閣下是否同意以下的主張？

"資訊科技教育策略已成功地令貴校達致"範式轉向"- 由一種主要以課本爲根據、以教師爲中心的教學模式，轉向較爲互動和以學生爲中心的模式"

同意 ☐ 不同意 ☐ 不知道 ☐

16. 閣下認爲資訊科技教育策略有何強項？

_____

_____

_____

17. 閣下認爲資訊科技教育策略有何弱項？

_____

_____

_____

18. 如要繼續於小學發展資訊科技教育，閣下認爲目前最需要的是什麼？

_____

_____

_____

其他關於資訊科技教育的意見/評論/建議

多謝閣下之寶貴時間。如閣下希望於本研究完成後獲得研究成果摘要，請於格內加上剔號並填上適當的聯絡資料。

☐ **聯絡人:** _____ **電話:** _____ **電郵:** _____

學校名稱: _____

Appendix 6 Semi-Structured Interview Schedule (English Version)

Thank you for agreeing to be interviewed.

The purpose of this interview is to probe the implementation of the ITEd policy in Hong Kong Primary Schools and how the outcomes have been influenced by them. The interview will take approximately 30 minutes to complete.

Would you mind my tape-recording the interview and taking notes during the process?

The data collected from the interview are for the purpose of researcher and they will be kept in strict confidence and will be anonymous.

1. Has your school successfully implemented the ITEd policy to achieve the outcomes of a paradigm shift from '*a largely textbook-based teacher-centred approach to a more interactive and learner-centred approach*'?

2. To what extent do you believe the visions of the ITEd Strategy have been achieved in your school?

3. How far have the policy's central components contributed to its successful implementation in your school?

4. To what extent do you support the key objectives of the ITEd policy?

5. Are you well-informed on the operational details of the policy? Do you have sufficient support to implement the policy? Has the process of ITEd policy implementation been successful?

6. What do you see as the strengths and weaknesses of the ITEd policy?

7. What do you believe should be done now to ensure the future development of IT education in the primary schools?

8. Do you have any other comments, opinions or suggestions regarding the implementation of ITEd policy?

Appendix 7 Semi-Structured Interview Schedule (Chinese Version)

多謝閣下同意接受是次訪問。

今次訪問主要是探討資訊科技政策於香港小學的實施情況及結果如何受到影響。是次訪問需時約 30 分鐘。

請問閣下是否介意我於面試時進行錄音及作筆記？

於是次訪問中獲得之資料只會用於研究用途，所有資料會保密及以不具名處理。

1. 資訊科技教育策略是否已成功地令貴校達致範式轉向 – '*由一種主要以課本爲根據、以教師爲中心的教學模式，轉向較爲互動和以學生爲中心的模式?*

2. 資訊科技教育策略的理想於貴校實施後的成功程度？

3. 資訊科技教育策略的主要配套對於貴校實施政策的幫助？

4. 閣下支持資訊科技教育策略的程度？

5. 閣下是否清楚關於施行的細節？閣下於施行策略時是否得到足夠支援？閣下認爲施行策略的過程是否成功？

6. 閣下認爲資訊科技教育策略有何強項及弱項？

7. 如要繼續於小學發展資訊科技教育，閣下認爲目前最需要的是什麼？

8. 閣下有沒有其他關於施行資訊科技教育政策的評論、意見或建議？