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University of Huddersfield
School of Education and Professional Development

PhD Thesis

**Issues Relating to Information and
Communication Technology in Middle
Schools in northern China with specific
reference to two cities**

Submitted by: Qing Chen
Supervisor: Dr. John McComish
October 2007

Abstract

The use of information and communications technology (ICT) in schools has become widespread in many countries throughout the world. The extent to which it has been incorporated into the work of schools varies widely from simply as a tool to help produce documents to one that is fully integrated into the whole school curriculum. Initiatives taken to encourage teachers to use ICT in their teaching and learning methodologies inevitably raise awareness of pedagogical issues and how these should be reappraised in the light of the demands of encompassing the new technology. China started the process of introducing ICT into its schools later than many other countries. This study examines the use of ICT in middle schools in cities in north east China to discover the attitudes of teachers and students to how effective the use of ICT is from their viewpoints. In addition the study ascertains the possibilities for further development of the use of ICT to enrich the students' education. Where possible the interpretation of the analyses of the findings are generalised further from the two cities in which the survey took place.

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Chapter One

Introduction

1.1 Overview

It is apparent that the use of ICT in the classrooms of schools in China is increasing rapidly. Before leaving for the UK ten years ago the researcher had been a teacher in a middle school in a city in northern China. When conversations with her former colleagues turned to their continued work at the school, then the use of ICT, and how it was changing their teaching and learning methodologies, was always at the forefront of their thoughts; hence this study.

The purpose of the study is:

1. to examine the use of ICT in middle schools, which cover the last years of compulsory education, in two northern Chinese cities
2. to ascertain the possibilities for further developments of the use of ICT in education in cities in northern China

1.2 Research questions

Specifically, the aims of the study are:

1. How is ICT used in middle schools in northern Chinese cities?

2. What are the views of teachers and administrators on the most effective use of ICT in these schools?
3. What are the views of the students on the use of ICT in the classrooms in northern Chinese cities and in a broader context?
4. What are the needs and implications for the continued and expanded use of ICT in the schools in cities in northern China?

1.3 The thesis framework

This research thesis investigates the use of ICT in middle schools in cities in northern China, in the context of the impact it has had on teaching and learning methodologies, by means of questionnaires specifically aimed at, and distributed to, pupils and teachers in two schools. These schools vary from the top key schools to ordinary schools so that the research conclusions will be from the whole cross section of northern Chinese secondary education. More data will be collected through classroom observations and interviews with students, teachers and headteachers. This use of multiple methods of data collection, in this case a combination of quantitative and qualitative methods, is known as triangulation and is one way of attempting to avoid bias in the investigation. The effectiveness of the analysis will depend upon the analysis techniques used rather than the amount of data collected. The thesis follows the normal, well established, format of introduction and background, literature review, methodology, findings, analysis, discussion and interpretation, finishing with the conclusion.

Chapter One reviews the context, background, rationale and aims of the investigation and the demands it poses.

Chapter Two gives the contextual information concerned with education and ICT in China along with some directions taken by the British government. This includes background information about government policies and strategies introduced for the purpose of integrating ICT into the curriculum of schools.

Chapter Three is a review of the literature appertaining to the use of ICT in education. The first part is concerned with literature whose subject matter is Chinese education with particular focus on the use of ICT. Some of the literature that has been reviewed has been published solely on the Internet and is only available there. The second part of the chapter focuses on the literature published in the UK. It examines the effects of various government initiatives, looks at the factors that enable the incorporation of ICT into the curriculum to be a success and the barriers that exist against the uptake of ICT in education. A review of literature investigating the use of ICT in education from other countries forms the third section. This gives views as to the present situation of the use of ICT in education in many other countries.

Chapter Four examines the process of selecting and justifying the methodology chosen to conduct this study. It was decided that a triangulation of both qualitative and quantitative methods would be used through questionnaires, interviews and lesson observations. Suitable methods to analyse the data were selected so as to ensure that the findings generated would be as realistic as possible.

Chapter Five summarises and presents the findings of the quantitative data (contained in full in Appendix 3 and 4) that has been collected by the questionnaires

and analyse them using The Statistical Package for Social Sciences (SPSS). The same package was used to structure the information into a suitable form.

Chapter Six presents the qualitative findings from the semi-structured interviews and lesson observations and analyses them. The data was analysed using the themes of key strands that emerged during the interview process.

Chapter Seven provides the interpretation and discussion of the analysis of both the qualitative and quantitative research. Where appropriate, a comparison is made with the findings from the literature review from China, the UK and other countries. The focuses for the chapter are the aims of the research as stated in section 1.2.

Chapter Eight presents the conclusions of the study. It summarises the position of the research and discusses what the implications are for teachers, schools and policy makers in cities in northern China. It gives recommendation for possible future research studies.

1.4 Background

The use of Information and Communications Technology (ICT) is an important indicator of the modernisation of Chinese education. Because of the vastness of the country, Chinese distance education, which started with correspondence education in the 1950s, has been an important feature of the Chinese education system. Radio and television universities and colleges were widespread in the country by the end of the 1970s and a web of satellite education took shape in the 1980s. The spread of information technology and computer networks has led to their use in distance

learning and the subsequent merging of those within the satellite education structure has resulted in a very rapid development and expansion of distance learning.

The position in China is that, in recent years, computers have been acquired and regional campus networks set up and widely used by some schools in the larger cities. Teaching slides, films, tape recorders and videos for all disciplines have been used in many secondary and primary schools for some time, but the use of computers is relatively new. Multimedia software, co-produced by higher education institutions, is becoming widely used in teaching. A document from the Ministry of Education in China entitled 'Strengthening Educational Reform and Boosting of Overall Education Qualifications' (1994) emphasised that

Computer and information technology should be used in senior secondary schools and some qualified junior secondary and primary schools. All the higher education institutions and key secondary vocational schools should participate in the educational science and research network, and secondary and primary schools will be brought in step by step.
(p.1)

The Ministry of Education decided in 1997 to identify and equip 1000 schools throughout China with the intention that they would be leaders in the use of modern educational technology; the express aim being to drive the development and reform of basic education. The Action Scheme for Invigorating Education for the 21st Century, approved by the State Council in 1999, regarded modern distance learning as one of the key projects. The initial target of the project was to set up a modern distance learning network. The use of ICT has therefore become a focal point for local and distance education in China.

The aim is to allow five to ten years to set up a campus network and ensure it covers ninety percent of the schools all over China. The children and the teachers can share the educational resources over the net with the aim of improving the quality of educational provision.

The purpose of this study is to examine the use of ICT in teaching and learning in middle schools in northern Chinese cities, because they are urban and typical of the usage of ICT in such schools, and explore the possibilities for further developments in classroom practice and in-service training. The Chinese government is clearly making huge efforts to integrate ICT into the whole curriculum of schools. It believes that the study and application of ICT should be integrated with the development of educational concepts, and that ICT should be applied to the improvement of the educational system both in its content and the methodologies used.

According to a document from the Chinese Ministry of Education issued in 2000,

The Chinese government will spend five to ten years, starting in 2001, promoting ICT education among secondary schools (including vocational and technical schools). The use of ICT will be made compulsory throughout the country, and coverage will be expanded to over ninety percent of schools nation-wide as quickly as possible. Moreover, taking into consideration local conditions, different methods will be explored to make the Internet accessible to all primary and middle schools.

Ninety percent of primary and middle schools will gain access to the Internet via broadband access, and for the remaining ten percent, multi-media teaching facilities and other resources will be made available.

(p. 1)

The introduction of the computer and then ICT itself into education in schools in the UK followed a somewhat similar pattern to that in China. Computers were first introduced into schools in the UK in large numbers as part of the Microelectronics for All in Education Project (MEP) in 1981. Initially the main area of study was computer studies with the focus being the computer itself; the situation in China was very similar to this only a few years ago.

The use of ICT in UK schools has expanded rapidly since its introduction and there has been a move away from the computer as an object of study to the computer as an aid to study.

This comparison between China and the UK can be used when discussing the interpretations of this research.

1.5 Rationale

The disparity between the huge population of China and the, at present, rather narrow careers field open to it means that the majority of adults are employed in menial work for which anything more than a very rudimentary education has not been necessary. Hence, until recently, there has been little attempt to develop the national education system so that it can encompass the whole of the populace of the country. The Chinese national curriculum focuses on the entrance examinations that pupils take when progressing from one tier of education to the next. These tiers are classified as primary, middle and high schools followed by universities and colleges.

The classroom in China has been a sterile environment in which teachers speak, children listen and there is little spontaneous interaction between the two. The question is will the introduction of ICT, with a holistic approach encompassing the whole school curriculum, break this barrier and lead to a true teaching and learning experience in which the children are the focus? China can learn from the expertise developed in the UK in this use of ICT for expanding educational methodology.

1.6 Context

1.6.1 ICT and new learning opportunities in education

Although ICT is seen by most professionals to have vast potential in education, it is suggested that approaches to teaching and learning methodologies will have to change fundamentally for this to be realised. This stance is taken by Loveless (1995):

It is not possible to consider the use of ICT in classrooms without reflecting upon one's beliefs about learning and teaching. ICT capability can be seen as much more to do with an approach to ways of learning and working than as the development of a set of skills.
(p. xii)

It is possible that developing the ICT capabilities of students could increase their confidence in expanding their existing boundaries of thinking and doing. It could give them the skills to be able to select and use methods which are appropriate to their tasks and identify situations where the use of the computer may or may not be appropriate. This suggests that they could become more able to reflect and comment on their use of ICT and begin to recognise how information and communications technology affects the way in which people live and work.

The need is for teachers to interact creatively with ICT and 'shape its use'. In this way, computer-mediated tasks are embedded within a wider framework of learning tasks which themselves are part of the process of task-negotiation between teacher and students.
(Sheingold, 1987, p. 54)

Traditionally, in China and the UK, teachers, being organisers and presenters of learning materials, have taken a didactic approach in the classroom. ICT can be seen as freeing them from these restraints to take a more individualistic approach to the learners.

One way in which ICT can be used in the classroom is to take over these roles. This has implications for both teachers and learners: the computer, by providing an additional or alternative source of knowledge may reduce the dependency of students upon the teacher. The aspiration is that this will liberate the teacher's time and enhance the student's repertoire of learning skills, enabling greater student autonomy. This would allow students to maximise their active role in their learning and help prevent teaching from being construed by teachers as a technical procedure of transmitting knowledge to passive learners.
(Davies *et al.*, 1998, p. 15)

The government in the UK has recognised for many years the need for integration of ICT into schools. In its paper, 'Connecting the Learning Society', introducing the National Grid for Learning (NGfL) in 1997 the Prime Minister stated:

Technology has revolutionised the way we work and is now set to transform education ... standards, literacy, numeracy, subject knowledge – all will be enhanced by the Grid and the support it will give to our programme for school improvement.

Students can begin to appreciate some of the ethical issues relating to personal information being stored on computers as they are encouraged to talk about the different kinds of personal information which might be kept in different places, such

as on doctors' records, at banks or for clubs and societies, and to reflect on how this information is used. It is necessary to identify how students are progressing with these ethical aspects in their use of ICT, in addition to their practical skills in handling the equipment and their discernment in the use of standard applications and selection of appropriate software packages, when making an assessment of their ICT capability. The structure of teaching and learning will change to permit communication technologies to play as important a role in education as they do in commerce and daily life. Teaching and learning opportunities that become available through electronic communications are described in later chapters of this work, including a brief outline of the services and a range of case studies of their applications to education, for the purpose of enhancing the curriculum and the professional development of teachers. This position is emphasised and reinforced by recent work undertaken by Scrimshaw (1998).

The ever-increasing influence of the computer in schools and in the wider community will demand a far deeper reappraisal of the teacher's role than is commonly recognised, requiring a fundamental and continual process of rethinking what is taught, how it is taught and why. If this change is not to be externally imposed, teachers themselves will need to develop forms of reflective classroom practice that enables them to make the best use of the educational and professional opportunities as they open up.
(p. 112)

The introduction of ICT into the curriculum of schools has started to change the traditional teaching methods in China. The established method used by teachers in China has been alluded to earlier in the section. This was to maintain a discipline in which students are quiet, which is not straightforward with class sizes regularly exceeding sixty, with their only verbal contribution being as a response to a direct question from the teacher. To ask a question of the teacher the students simply had to

raise their hands and wait for the teacher to respond; this was not always forthcoming. There is a national curriculum in which lessons are based on the same text books throughout the country with little freedom to use other sources. Much of the students' learning was done by rote with the focus always on the examinations. Now, not only is there developing a more comfortable dialogue between the teachers and the students in which each elicits responses from the other, but also the new technology is being used to enhance not only the teaching and learning methodologies but also the teachers' learning.

Multi-media communications also appear to be valuable in the supervision of student teachers. Communications skills will be more and more as important as technical ICT skills in education. In the not too distant future vast amounts of information will be readily available to all who want it through global information superhighways using electronic communications. This should provide further educational opportunities for all those who have completed their compulsory schooling and want to develop their abilities and skills.

1.6.2 The role of the teacher in China

The possibility that learning with computers in China leads to the teacher and students becoming more assertive than in the other lessons is one that this study will explore. The traditional Chinese teaching method is one where the teacher talks most of the time to the class. Only when the teacher asks the students if they have any questions are they expected to speak. The teacher then gives the answers and during this process the rest of the class is very quiet. If the class does become noisy the usual reaction of the teacher is to be very angry. The students who ask unusual questions of teachers

are considered to be 'naughty' or 'bad' students. Before coming to UK two years ago the writer was a teacher in China for nine years. What the researcher perceives as being the main difference between the UK and China is the attitude of the teachers to their students. English teachers always seem to encourage students to try to find more ways to solve the problems they meet. They say '*Why not try...*' or '*How about...*' whereas Chinese teachers always give only one or two direct answers to the students. In China the teacher does not encourage students to try to find more ways to solve the problems they meet. The traditional perception is that the teacher can answer any questions the students may ask, but in fact it is obviously impossible for a teacher to answer every question students can be thinking of.

It is not disputed that change in all aspects of teaching and learning is inevitable with the incorporation of ICT into the curriculum. Neither is the effect it will have on the professionals whose task it is to roll out and use ever-evolving technology.

Most of the new ways of knowing require teachers to establish new classroom routines and procedures that reflect these evolving epistemologies. Since learning teaching involves learning to establish and manage such routines, any shift in practice will be risky in the eyes of any established teacher who is already comfortable teaching in a particular way. Any shift in routine costs teachers dearly. We have to be prepared to provide organised, thoughtful and long-term continuing professional development which acknowledges not only the demands of change on teachers' beliefs, knowledge and practice, but the high cost of a failure to address the purpose of the profession in the Information Society.

(Loveless *et al* 2001, p. 82)

These views expressed by Loveless encapsulate the hopes and fears of teachers with the inevitable increased use of ICT in education; the hopes of both teachers and students of a freedom from the strictures of a prescriptive curriculum and the fears,

especially of the teachers, with the management of a much more fluid classroom environment.

However, whatever the technologies introduced into education and the greatly changing direction in the classrooms and developing methodologies needed to encompass all the benefits from the new and ever changing technologies the fundamental role of the teacher will remain largely the same.

Regardless of the focus or scope of the innovation, it appears that one type of result consistently occurs; a result that acknowledges the teacher as the key figure in the eventual success or lack of success of any computer-in-education initiative.

(Collis, 1996, p. 32)

A positive effect occurs where headteachers are enthusiastic and visionary about ICT, and can be creative with funds, resources and expertise. Teachers report a positive impact when senior managers in school, not just ICT co-coordinators, lead by example. Many commented on how ICT changes the teaching process by allowing the teachers more and more to take on the role of a facilitator.

Teachers who adopt a technology based approach usually progress from presenter to coordinator of learning resources, thus freeing them to work individually with students. They move from being the 'sage on the stage' to the 'guide on the side'.

(Pisapia, 1994, p. 3)

It is evident that for teachers to have the confidence to integrate ICT into their teaching practices then support is needed from all involved from headteachers and administrators to teaching colleagues.

1.6.3 ICT supporting the teachers' work

In modern society, where the Internet can be easily accessed, the teachers' role will inevitably change. Teachers are not only sources of information, but also researchers and facilitators of learning.

Initially it was thought that introducing computers into the classroom would make the teacher less relevant to the learning experience of the students. The views of Wegerif and Dawes (2004) suggest that this is not the case.

There seems to be no evidence that children reliably learn general thinking skills just by working with computers, even if they use the programming languages and 'mind tools' that have been promoted as a way of learning to think. However, there does appear to be good evidence that some ICT activities can be used to teach general thinking skills when used as a resource for teaching and learning dialogues. Talking to others while working at the computer encourages the articulation of strategies and so increases the likelihood of learning skills that can be transferred to new situations. The teacher has a crucial role in making the thinking aims of activities explicit, modelling good thinking strategies and designing learning activities so that skills learnt in one context are applied in new contexts.
(p. 59)

The classroom organisation needs to afford the children opportunities to work with a variety of media over a period of time in a range of activities. In a busy and crowded classroom, like most of those in middle schools in China, it is impossible for all the children to use computers in every task. More and more will have access to computers outside the classroom and this can be used to advantage. There is a downside to this in that those children who do not have a computer at home they can use are potentially at a disadvantage. Giving students access to use the computers, in libraries and computer

suites for example, at school during their lunch time and after school in the afternoon can go some way to alleviating this problem.

When setting homework and project work, teachers need to help children effectively exploit all the resources available to them at home and at school. Encouraging them to use a variety of sources, both print and electronic, and structuring teaching and learning experiences to improve children's information handling skills across all media and information types (images as well as words) is a sound beginning.
(Downes, 1998, p. 77)

Their access to computer facilities should be planned to give them the experience of searching for information, experimenting, rectifying mistakes, changing and refining ideas, saving and printing work in progress and producing a final outcome which can be shown to an audience. The regular displaying of work on a 'work in progress' board in the classroom provides children with the opportunity to discuss their ideas and techniques, make comparisons and explore extensions in order to evaluate their work and consider ways forward.

In order to become ICT capable, teachers must become aware of the affordances of the technology for learning within their subject. Teachers must develop metacognitive knowledge and skills which enable them to spot opportunities for appropriate use as they occur.
(Kennewell et al, 2000, p. 92)

It is apparent that ICT can support teachers in their work in the education of all the students in their care. This support can be as simple as just using computers in helping to write lesson plans and in record keeping to advanced techniques in incorporating ICT into their teaching and leaning methodologies.

1.6.4 In-service training of school teachers in China

The provision of in-service training for teachers in primary and secondary schools in China can be divided into degree and non-degree qualifications. The courses that lead to a degree include, at the one extreme, courses without any ICT content for teachers whose qualifications do not encompass ICT at all to, at the other, upgrading education for teachers with certificates that include a sound ICT background.

The provision of non-degree courses for serving teachers is the main part of continuing education which has been the key to secondary and primary teacher training. This training focuses mainly on encouraging correct political awareness, ethics, evolving educational theories and teaching methodologies for those teachers to enable them to obtain additional teachers' certificates. In-service teacher training institutes and departments in the secondary teacher training schools are the important bases for continuing education for primary and secondary school teachers. The theory of education, evolving love for education and students, familiarisation with education regulations and teaching outlines, common rules on textbooks and teaching and good professional ethics are formed through probation training in the first few years after starting out in the profession.

From 1990 to 1994, China set up a co-operative project of in-service teacher training for middle schools with the World Bank and another one from 1993 to 1998 for teacher education and development. What is more, there has been an increase in teacher educational exchanges between China and many other countries and regions in the world by visiting delegations, study tours, teachers and scholars establishing school co-operation projects and conducting research activities on education.

Teachers and staff of teacher education establishments have been invited on many occasions to participate in international symposia and seminars. Mutual understanding and friendships have been strengthened through these exchanges which are proving to be quite beneficial to the development of teacher education in China. (CERNET, 2001, www.edu.cn)

The development of the use of ICT in the UK classroom has not been without difficulty. In spite of the resources committed to training, many teachers have yet to develop confidence and competence in ICT. The time taken for a teacher to be confident in the use of ICT in the classroom cannot be underestimated.

For most teachers, it requires five to six years of teaching with computers to master practices and approaches, and to build the foundations from which they can flexibly make choices about using new applications and using familiar applications differently.
(Hadley and Sheingold, 1993, p. 261)

There has been reticence in China about taking advantage of government funded training due to time demands and lack of basic skills training. Having a computer at home seems to have a significant impact on ICT capability but this provision is not available to all serving teachers. It is possible that motivation for teachers to use ICT in lessons may be enhanced by making extra payments to them. Teachers do not appear to be negative about ICT but many do not yet use it confidently in their lessons and few use ICT in a way that motivates pupils, enriches learning or stimulates higher-level thinking and reasoning. ICT co-ordinators report that they are having to work very long hours to develop whole school ICT policies and practices. However, there is often little or no compensating reduction in their teaching loads.

These same problems were evident when ICT was being introduced into education in the UK. The Initial Teacher Education and New Technology Project (INTENT) was set up to address this many faceted situation. Its aims were to enable all tutors to prepare student teachers to use computers in their teaching of children.

Overall, Project INTENT was most successful where it was sensitive to, but not hidebound by, the structure of the organisation and the micropolitics of the institutional life. Attempts at shared decision making within a traditional line management structure created confusion unless they were handled with sensitivity. Nevertheless, it was clear that, whatever the enthusiasm of the staff development tutor, the involvement of a manager was often crucial to making progress. It was important for the project to engage with the political realities of institutional life; at the same time it provided opportunities for managers and staff development tutors to acquire new leverage on institutional power structures.
(Somekh et al, 1998, p. 207)

In view of the fact that the UK government has been encouraging the use of computers in the classroom for over twenty years the suggestion that many teachers still do not feel confident about their ability to use ICT can be seen as very disappointing. This is despite government finance being made available for the in-service training of teachers and ICT being made a compulsory element of teacher training courses since 1998. This was evident in the very early stages of the integration of ICT into the curriculum. This rather disappointing observation was supported by Loveless (2003) who noted:

ICT has not had the widespread effect in classrooms that was hoped. It is not possible to consider the use of ICT in classrooms without reflecting upon one's beliefs about learning and teaching.
(p. x)

Research into the experiences of teachers in America has produced initial results similar to those in the UK. It found that peer support alongside in-service training is important in giving teachers the confidence to use new technologies in their teaching.

If teachers are to successfully incorporate a new and complex resource like computer software into their teaching practice, they must have access to other people from whom they can learn, either experts who have already mastered the resource or a community of teacher-learners who pool their efforts and share their exemplary findings.
(Becker, 1994, p. 303)

Time and funding constraints were also in evidence in the initial days of teacher training in America as was determined in research conducted by the International Society for Technology in Education.

Curriculum integration is central if technology is to become a truly effective educational resource, yet integration is a difficult, time-consuming and resource-intensive endeavour.
(Office of Technology Assessment, 1995, p. 2)

The knowledge that, when ICT was introduced into the curriculum of schools in other countries, it was found that in-service training and the support of colleagues was important in giving the teachers confidence to use the technology effectively, should give some comfort to teachers in China many of whom are themselves lacking in confidence at the moment.

1.6.5 Classroom innovation

The most striking factors to emerge from the accounts from Chinese middle schools are not only the formal discipline and structure of the classroom environment but also the uniformity of teaching practice and style as experienced by all participants across

a range of ages and geographical distribution. This research seeks to investigate if this is likely to change when computers become commonplace in the classroom.

Group work among the children should become commonplace and thereby place additional pressures on teachers to maximise its effect. Research in the UK has shown the dynamics of groups to be vital in their success.

Children working in groups have significantly different experiences depending on their gender and group composition. There may also be an influence of task. The recurring observation from natural classroom tasks is that boys see the computer as being in their domain, but classroom experiments find that, in single gender groups, girls perform as well if not better than boys. It is only when boys and girls are paired together that they perform poorly.
(Underwood, 1998, p. 38)

It is suggested that the dynamics of the classroom in China will undergo fundamental change to the traditional arrangements that so characterise the teaching experiences of students at present.

1.6.6 Relationship: teachers and students in Chinese schools

In China, the level of personal relationships that evolve between students and teachers is of interest and many students who participated in this project talked about the desirability of getting to know their teachers personally or about the support they or their families have received from teachers during their education. For many of the participants the personality of the classroom teacher, as well as their level of professional skill and workplace motivation, seems to be a key influence in determining the emotional response to education in later life. Indeed, there were a number of accounts which reflected the importance of the strongly personalised, and

sometimes parental role, teachers took with students in China, right up to high school levels.

This mutual respect between teacher and pupil has had a marked influence in the adoption of ICT in the UK, with the students being, on the whole, much more comfortable than their teachers when using new technologies.

Sometimes students have used applications with which teachers are unfamiliar and, in some cases, have been commissioned by schools to develop packages of materials to introduce ICT ideas to teachers. At best, it has generated classroom investigations into how ICT can bring about fundamental changes in teaching and learning. It has resulted in students and teachers working as co-researchers and co-learners. The next step is to use this as a heuristic framework to help students to review their own experiences in various school contexts; especially, to describe their working relationships with teachers and to reflect on their own learning.

(Bell and Biott, 1998, p.136)

That the interplay between teachers and students in lessons is described as a working relationship is an example of the change that ICT can bring about in classrooms.

1.6.7 Distance learning

ICT can actually create a virtual school featuring autonomous learning with students as the principal part, which is an emerging kind of fence-free school. Different from traditional broadcast/TV-carried education in China, it enables interactive teaching and learning at any time and place in a network environment, providing an easy, yet efficient, access to a wealth of resources and thereby improving its educational quality. Before ICT, education featured students physically going to their classes, while in the information age of the future education will promote classes that will be available to the students wherever they may be. With the evolution of advanced

distance learning, educational concepts, contents, modes and structures will change significantly.

The Ministry of Education in China has released the provisional administration methods for educational websites and on-line schools, exhibiting the jurisdiction of the ministry over educational websites and Internet-based schools.

The development of ICT in learning may provide more educational resources, implement sound resource allocation and improve the science-culture quality of the nation; accommodating the real demands of the socio-economic and cultural development in China.

1.7 Summary

This chapter has outlined the background to the research and indicated the structure of the thesis. Consideration has been given to the methodologies employed in collecting data, the following analysis and the formulation of the interpretations and discussion of the findings. The research focuses on the use of ICT in middle school teaching and learning in two northern Chinese cities and explores the possibilities for further developments of its use.

The next chapter will give the contextual background to the organisation of education in China with special reference to the aims and structure of middle schools. There is a description of the policies introduced by the Chinese government to incorporate ICT into the whole school curriculum. These initiatives include the allocation of finance and how schools throughout this very large country can be accommodated with these

initiatives. The chapter then follows with the directions given by the British government to integrate ICT into the curriculum and how the policies demonstrate its commitment to the technology.

Chapter Two

Contextual Background

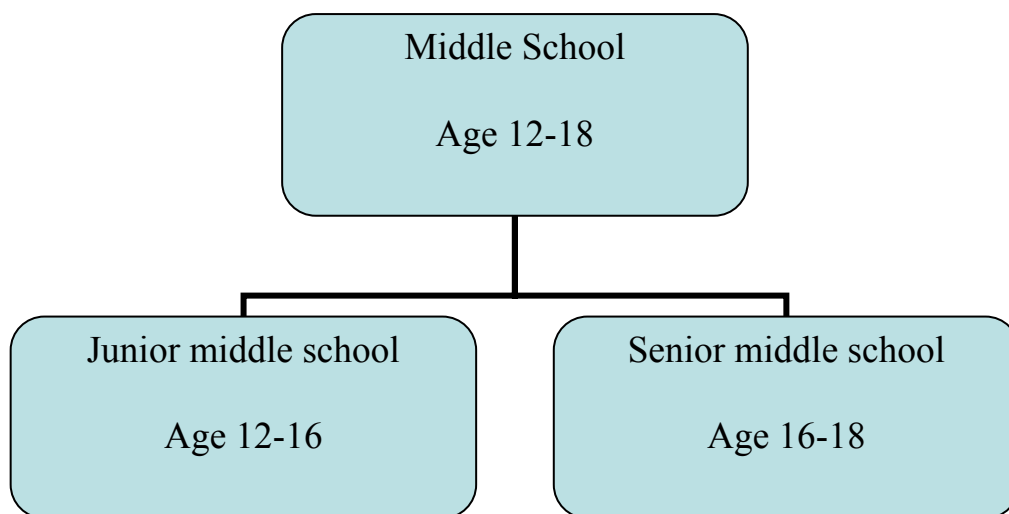
2.1 Introduction

The direction of education in any country is dependent upon the policies imposed and the finance provided by the Government of the day; this is as relevant in China as it is in England. The first section of this chapter gives the background to the organisation and structure of education in China with particular reference to middle schools. This is followed by a description of the initiatives taken by the Chinese government to integrate ICT into the whole school curriculum. The second section of the chapter describes the policies the British government has introduced to make ICT an essential part of the curriculum of schools in England.

2.2 Education and ICT in China

2.2.1 The structure of education in China

The educational system in China is fundamentally different from that in England. Primary and secondary education in China is composed of three stages: primary school, junior middle school and senior middle school; the total length of study being twelve years.



From birth until they are two or three years old children are either placed in a nursery or looked after at home. From the ages of three to six years old children are usually in kindergarten and from six to twelve years old they study in a primary school. This is followed by them being educated in a middle school from the age of twelve to eighteen years old. Usually the middle school is separated into two parts; the first three years are usually called junior middle school while the second three years are referred to as senior middle school. The parents of students between six and fifteen years old do not have to pay tuition fees. However, for this free tuition, the student must be the only child in the family. If the family has more than one child, they will have to pay the tuition fees for all their children. This is the statutory period of schooling in China and is generally referred to as the Nine Years of Obligatory Education.

In addition to middle schools there is another type of school known as a vocational school. Vocational schools are one of the options available to children when they

finish junior middle school. At this point they normally have three choices: to continue with their education by going to a senior middle school, to go to a vocational school, or to start work. If they go to a senior middle school (high school) it means that they will have the opportunity to go to university after studying at the school for three years. Going to a university is conditional on the student passing strict entrance examinations. Which entrance examinations a student sits depends upon the subject to be studied at university. However, the papers in the entrance examinations are identical throughout the whole of China. Alternatively there are a variety of types of vocational schools: e.g. computer vocational schools, catering vocational schools, fashion vocational schools, etc.

Students studying at computer vocational schools will learn more computer skills than pupils in other types of vocational schools or senior middle schools. Students from computer vocational schools usually start work as secretaries after they have finished their period of study. Professional computer companies always employ university graduates.

2.2.2 The middle school in China

As stated previously, the duration of study in primary schools is six years, in junior middle schools three years and in senior middle schools three years. Primary and junior middle school education is compulsory.

The National Education Plan states that every child reaching the age of six should enter a primary school but in practice there are regions of the country where facilities are not available and the age at which a child enters a primary school can be

postponed until they are seven years old. The plan also states that, in areas where junior middle school education has been made basically universal, all primary school graduates should enter junior middle schools without sitting any entrance examinations. However, graduates from junior middle schools seeking to continue their education in senior middle schools have to sit and pass locally organised entrance examinations before they can do so. In other words, education at high schools is not a matter of choice but is determined by ability.

Throughout compulsory education, students are required to take examinations and tests at the end of each semester and school year and before graduation. In primary schools Chinese language and mathematics are required examination subjects for graduation, while other subjects are also tested. In middle schools, the graduation examination subjects are determined by the scope of those subjects set by the state which are taught in the graduating class, while the students' performances in other subjects are not examined.

2.2.3 The size of middle schools, classes and year groups

In China, middle school refers to both junior middle school (age 12-15) and senior middle school (age 16-18). Senior middle schools are also known as high schools. The size of middle schools varies from a few hundred students to well over a thousand. In fact, some middle schools in big cities have more than two thousand students, although, because of the Chinese government's policy of controlling population growth (from 1978 China started to have a 'one child policy'), the number of students has recently been falling. Normally, in every class in a middle school there are between thirty and fifty students. In some middle schools in rural areas the numbers

are smaller, and in some new private schools the number of students in each class is less than twenty. However, it should be emphasised that most of the middle schools are state middle schools where class sizes are greater than thirty.

Junior middle schools and senior middle schools each have three grades, or years, of study and each grade normally has between four and eight classes, but different geographical areas are organised in slightly different ways. The number of students who are enrolled in some key middle schools is much higher than the average. Most of the schools have one thousand to three thousand students in the big cities in which the population is over one million. In small cities in which the population is under one million, the pupil number is usually less than one thousand per school.

2.2.4 How children are allocated to classes

Different areas have different ways of allocating children to classes. One method of allocation is by ability where every class contains students of similar abilities. However, a very common method is to try and have the same range of abilities in each class. This method means that every year before the new students arrive, the headteacher along with another two or three other teachers will visit the primary feeder schools to work with the primary school staff in assessing the children's performance. The students are separated into three groups: high ability, average ability and the least able, according to the children's examination results. For example, if there are 250 students to come to the junior middle school, they will be separated into three groups with approximately eighty in each according to their ability. Children are then allocated to a class so that each class has equal numbers of

students from each ability group. The aim of organising the classes in this way is to be fair and to have an even distribution of ability across all the classes.

Things are changing very quickly in China today, and different local Educational Bureaux have their own policies to deal with this. In the author's home town, which has a population of over 8 million, there are few key schools that have the priority to select the high ability students, which means the pupils are very good at maths, music, or sports etc. This has happened ever since it started in the mid eighties; many parents complain but it still carries on.

2.2.5 Aims of the middle school in China

This section will examine some Chinese government documents that refer to general educational policies and then focus on the aims of using ICT in Chinese education.

Since the promulgation of the 'Compulsory Education Law of the People's Republic of China' in 1986, the nine-year compulsory education period has been the continuing aim of all the governments and significant progress has been made towards its full implementation. According to the 1998 statistics, the enrolment rate for primary school children was 99%, and the proportion of primary school graduates continuing their studies in junior middle schools reached 94%. Primary compulsory education has basically been universalised in the areas in which 90% of the population live and junior secondary education has been universalised for 73% of the national population. In large cities and the economically developed coastal areas, the universalisation of senior secondary education has been launched.

(MoE, 2000, www.edu.cn)

A possible reason why these figures are relatively low is that China is still a developing country, and many rural areas, which are far from the cities, are very poor and parents there could tend to pay less attention to their children's education,

preferring to encourage their children to earn money or help them with the work at home as early as possible. However government documents make it very clear that those nine years of compulsory education is national policy.

The Chinese government attaches great importance to the universalisation of compulsory education in rural, poor and minority areas. In 1987, the Ministry of Education and the Ministry of Finance jointly issued the document 'Opinions on Some Issues Concerning the Reform of Administration of Basic Education in Rural Areas'. At present, administrations at county, town and village level provide basic education with administrative power being held at county and township level with major decisions being made at county level. Efforts are currently being made to integrate the development of education and the consequent upgrading of the quality of the labour force with the development of local economies and the advancement of the cultural, ethical and living standards of the people. As a result, the development of rural education and local economies has been promoted. Now, more than 95% of primary schools, 87% of junior secondary schools and 71% of senior secondary schools are located in towns and villages with the remainder being in big cities. The Ministry of Education and Ministry of Finance launched the 'State Project for Compulsory Education in Areas of Poverty' which lasted from 1995 to 2000. The central government provided a special fund of 3.9 billion RMB (Chinese Yuan), which, together with 10 billion RMB from local governments, was used for the improvement of school facilities in poor areas.

(China Education and Research Network, CERNET, 1998-2000, www.edu.cn)

The school year for middle schools is divided into two semesters. The school year for junior middle schools is comprised of thirty-nine weeks of teaching with an additional week in reserve and twelve weeks of holiday. The school year for senior secondary schools is comprised of forty weeks of teaching with one or two weeks in reserve and ten or eleven weeks of holidays. A five-day week has now been implemented in middle schools. Before 1996, all the schools in China worked a six-day week.

2.2.6 The government's attitude to ICT in schools

The Chinese government initially saw the introduction of the computer into schools solely as an object of study i.e. in computer studies classes. However, as in many countries, the focus has gradually changed to exploring the use of computers to improve teaching and learning.

The Ministry of Education decided in 1997 to set up a thousand experimental schools in which to introduce modern educational technology. It decreed that they should make full use of modern educational technology, to promote the development and reform of basic education. The main aim was to improve the overall quality of education in secondary and primary schools. Another objective was to search for more effective teaching methods. Four hundred and thirty-three secondary and primary schools were confirmed as being in the first group of experimental schools in January 1998. They were seen to have yielded fruitful results in the initial stages of the experimental research in various disciplines, knowledge acquisition, and skill training.

(MoE, 2000, www.edu.cn)

The Ministry of Education in China pays a great deal of attention to the abilities of its teachers to use ICT in schools. The Chinese Educational Newspaper reported in June 2006 that, from 1999 to 2003, the government promoted a Teachers' In-service Training Project in China. Most of the teachers were trained in various ways and learned the basic skills of using ICT; this was to try to ensure that they were computer literate. The Ministry of Education also continued its cooperation with Inter Corporation and Microsoft Corporation to work together on developing teachers' training programmes. These initiatives have resulted in many teachers reaching a high level in their knowledge of ICT and their skills in using it.

Later the Chinese Educational Newspaper reported that there had been another document released from the Ministry of Education in China, it was called '2003-2007 Vitalise Education Plan' and a new project for training teachers. The government also launched a 'Primary and Middle Schools Teachers Technical ability Standard'. This included: teaching staff's educational technical ability standard; administration staff's educational technical ability standard and technicians staff's educational technical ability standard. The standards cover four parts, which are: 1. awareness and attitude; 2. knowledge and ability; 3. application and innovation; 4. social awareness.

From July 2005 the government started using the Standard in nine provinces in China and, from July 2006, it was implemented throughout China. The Standard requires that all the teachers in Primary and Middle schools in China must have at least 50 hours training in ICT in order to promote the development of the use of ICT in schools.

Under this big project, the Ministry of Education in China has a smaller one called 'Training Future Female Teachers Plan'. This project trained one thousand female teachers in 2001. It ensured that they could understand the basic workings of computers, how to receive and send digital messages and using and repairing the equipment. For many of these female teachers, who were from west and the poorest part of China, on the training programmes, it was perhaps the first time they had touched a computer or held the mouse; they just wondered how to use them. Twenty days later they were able to start to do some basic work on a computer. When they returned to their homes they were able, with the help of the facilities which they were

given through the development plans of China, to start using a computer in their teaching.

The Ministry of Education in China has invested a lot of money in the creation and production of software to be used in the delivery of computer education. Some businesses have come to realise that the market for educational software in China is huge so they have invested heavily in the research and development of educational software.

Many schools have encouraged their own teachers to produce teaching software for use in their classrooms. Many teachers, having graduated from universities, maybe interested in doing this sort of work. They are anxious to improve their teaching skills as well as making the lessons more interactive. Evidence from data collected in this thesis indicated that it was the geography teachers who expressed most interest in creating their own teaching software.

Using classroom computers with information processing packages reflects the fact that society is increasingly dependent upon information delivery technologies, and students should at least know how to use common applications. Additionally, there is evidence to suggest that thinking about information in the context of these packages can act as a catalyst for a student's intellectual development (see Section 6.2.1).

Alongside the introduction of computers into schools the government has also encouraged the setting up of teacher training courses. Over thirty higher education institutions have been offered the help of educational technology specialists to

promote the development of educational technology for the middle schools in China. Approximately ten institutions offer master degree programmes and three offer doctoral programmes; different levels of training courses at pre-degree, undergraduate, master and doctoral levels are being drawn up. The supply of educational personnel has strengthened the work in educational technology. The Ministry of Education has created the Instructive Committee of Higher Education Institutions for Educational Technology. This is responsible for directing the teaching of educational technology (CERNET, 2000, www.edu.cn). Actions such as these are important if teachers are to be able to exploit the potential of ICT in their classrooms.

Communication technology has its own special advantages and vitality. Its use in education can bring new vigour to teaching and learning. It widens the scope of teaching to a much greater extent than that made possible by radio and television. It can improve the standard of training for middle school teachers and it can also push forward educational reform and economic and educational development in remote regions.

China is making efforts to transform its educational satellite network into a digital network, using an interactive Ku wave system. An interactive feedback system is coming into being by making full use of Internet resources and interactive teaching and the updated educational satellite network will play a changed and more important role in delivering the country's distance education.

Educational communication technology is currently being developed in middle schools. The use of educational technology in middle schools in rural areas has, in

part, compensated for their shortage of teachers and textbooks. Great progress has been made in the development of practical skills using ICT in many middle schools. The author has personal experience of these achievements and her consultations with her former colleagues have confirmed them. Most of the teachers consulted said that, when using information and communications technology in teaching, they found the students were more interested in their studies and seemed better motivated. Experience also indicates that, after school, students enjoy doing more work on computers; ICT seems to stimulate their desire to study.

An interesting observation is that many students, when the researcher interviewed them, said they had taught their parents how to use a computer. Obviously, most parents did not use computers when they were at school, so children can now teach their parents how to use computers to use email, search for information, book travel tickets, check their bank balance, etc. Often the effects of this are that children not only have increased confidence in their use of ICT but also develop their social skills. This must be good for the children's self esteem, which has been shown to be a considerable factor in the achievements they eventually make.

There are, however, some other considerations from the teachers, students and the parents. On 5 September 2002, in the China Educational Newspaper, Shi and Dai argued:

We interviewed some students and parents; most of them do not like to spend more time on computer studies. They thought that using the computer to access the Internet, typing and painting is enough. One of the boys said: we learnt what our teachers taught us. It is enough to make pictures and use the Internet.

Most of the parents think much more about the senior school's entrance examinations for their children. Nearly all the parents said that computer studies is not one of the subjects of the examination. We do not want our children to spend more time on it.

The teachers have some more practical thoughts. They said we should be practical. Learning to use the computer and do some animations are good, but it is impossible to teach the students every thing.

(p. 3)

The same sort of arguments may have happened in schools and outside them as well.

That probably means that the computer has more and more become part of people's lives, it affects people's lives and whatever happens it cannot be avoided.

2.2.7 The application of ICT in the classroom

As stated earlier, information and communications technology provides students with opportunities for alternative learning situations. It can deliver superior and improved learning opportunities and environments for middle school students and this, rather than computer studies, is now the focus of ICT use in China.

The Chinese government is clearly making huge efforts to integrate ICT into the whole curriculum. It believes that the study and application of ICT should be integrated with the development of educational concepts, and that ICT should be applied to the improvement of the educational system both in its contents and the methodologies used. It was mentioned earlier (see Section 2.2.6) that teachers must have at least 50 hours training of ICT in order to promote the development of ICT use in schools.

Teachers will be required to apply ICT in the teaching of all subjects as much as possible, and ICT should be employed in students' learning and in their investigations

and project work. This process of using computers to facilitate the exchange of information is to be an important component of the teachers' techniques in their methodologies.

2.2.8 The National Curriculum in China

In 1994, the State Research Centre for Computer Education in Primary and Middle Schools, a subsidiary of the Elementary Education Department of the Ministry of Education, drew up the computer curriculum for primary and middle schools to regulate the syllabus for computer studies. It also contained the elements of ICT that were to be delivered in primary and middle schools throughout the country. The syllabus consisted of the following four areas:

1. Basic computer knowledge

This included information on computers and the classification of them. It detailed the nature of information, how computers handle it, and different types of computers including main frames, mini and micro-computers and laptops. It also included a brief introduction to the concept of computer languages such as BASIC, FORTRAN, Pascal, etc.

2. Basic knowledge of computer hardware

This section included the hardware components of a computer including the Central Processing Unit, the memory unit and the Disk Operating System. It also examined the importance of ASCII code and viruses and how to avoid them.

3. Important computer software

In China, USA PC Logo (Version 4.0) is chosen by most schools as the first piece of computer software to be used in lessons. China has developed some educational software of its own, but generally it is not as good as that produced in more developed countries. Microsoft Office was also an important part of the middle school computer curriculum as was a Word Processing System for Chinese which was produced in October 1989 by the Jin Shan Company.

4. Computer applications in modern life and their influence on society

The ability to perform speedy calculations is the basic and the most useful function of a computer. In most fields of science, there is a need to perform a large amount of difficult and very accurate calculations. If this is done by hand or with simple tools it wastes time and energy, but if a computer is used, the work will be finished accurately and quickly.

All kinds of material (including sound, pictures and words etc.) can be imported into a computer, changed to digital code and then edited, re-arranged, processed and have calculations performed on them before being exported to the required standards. This area of the curriculum focuses on these sort of processes and their potential. Typical examples would be using PowerPoint to teach the students in a biology class, creating and editing, music, using word processors for creative writing, etc.

The Chinese government feels that the use of computers in education still needs to be expanded, so it has drawn up a series of policies to promote the use of computers in schools and is constantly revising them.

It is well known that Chinese is a very difficult language to learn and it is also difficult to type on a computer, so Chinese students must learn how to use the computer in English as well as Chinese. This means that schools prioritise word processing courses in their curricula, and teachers involved in the teaching of word processing skills are highly valued and often quickly promoted.

The current policy emphasises that, if they have appropriate software and hardware, schools should use computers in teaching as many subjects as possible so that all teachers, not only computer studies teachers, use ICT in their teaching. To fulfil these requirements many schools offer teachers both pre-employment and in-service training on the use of computers in their teaching with the emphasis on how to use the computer as a tool.

With computers becoming a common tool for teachers and students in middle schools, there is a need for some students and full-time teaching assistants to be trained to manage computer laboratories and extend their opening times to enable and encourage teachers and students to use computers in their spare time.

Software development groups are being established to develop educational software for primary and middle schools. Based on the study of educational software of other countries, the groups plan to draw up schemes to create software suitable for domestic use. It is acknowledged however that millions of RMB of financial aid are required to meet current targets. Ideally, more than one development group should be involved in each subject area to ensure that the software presents a balanced viewpoint and avoids prejudice and stereotyping.

In 1996, in an attempt to clarify the 1994 curriculum document, the Ministry of Education drew up a document entitled 'Primary School and Middle School Computer Curriculum Guide'. After this there was a year of consultation with teachers of computing in schools. Having regard to this consultation, the final current computer curriculum was published in 1997.

This thesis is focusing on middle schools in northern Chinese cities and in them two computer textbooks are used to deliver the computer studies curriculum: Stage One and Stage Two. Stage One is for junior middle schools and Stage Two is for senior middle schools. The aim is for junior middle schools to allocate sixty hours per term to computer education while senior middle schools are required to allocate more than sixty hours per term.

Stage One consists of two parts: study of the computer language, QBASIC, along with two computer application databases, Chinese FOXBASE and DBase. The students are taught to use Excel software and how to write computer code.

Stage Two is to teach the students the structure of the computer, the nature of ASCII, Word Processing System for Chinese; DOS; QBASIC; and music creation software.

In spite of this planning, the pace of computer development is not uniform across China. Some of the middle schools can teach Stage One and Stage Two, others do not have sufficient resources to do this so they have to make their own changes to the curriculum.

He (2004), in discussion about the aims of Primary and Middle School Computer Education, said that

Reading, writing, calculating and information are the four props of information society's cultural foundation. The integration of ICT into the national curriculum will follow as a matter of course, it is the inexorable trend of socialist development, it is the requirement of the information society and also it is the requirement of the people.
(p. 2)

A lot of educators like Professor He have had discussions about ICT in teaching and learning in schools. They hope that teachers will change their methodologies from traditional teaching to more modern concepts of learning. They urge teachers to break the mould at the centre of traditional Chinese teaching and change to using computers, multimedia equipment and all the modern teaching technology as tools in their teaching techniques.

2.2.9 Special needs and computers

All students have special needs – some individuals will prefer some topics, teaching styles and learning approaches more than others and all classrooms have a range of abilities. However, there are many students with very special needs that it is possible that ICT will be able to help

China has a very large population and many cities have schools specifically for children with special needs. These include students with multi-sensory impairment as well as the students who are severely autistic. Some of these students need 24 hour care and have sensory and ambulatory needs. Teaching and learning with computers

cannot be ignored in these kinds of schools, where computers can enable students to overcome their difficulties.

There are other special needs schools in China where students study football and Kung Fu as main subjects. Normally these kinds of schools have students who all have emotional and behavioural difficulties. The pupils there possibly do not like to study mathematics, physics and other more usual subjects. Teaching and learning in these schools is more difficult than in most mainstream schools.

However, now students with challenging behavioural or emotional difficulties can also be reached with ICT and given opportunities which were not available to them previously. They can express themselves as individuals or as a member of a group which enables them to develop their ICT skills. Being able to share these skills with their peers and teachers gives these students more chances to demonstrate their abilities and ideas.

When, for example, deaf students learn basic computer skills, it is possible that they will feel motivated and encouraged to face their future with more confidence. They could have learnt about computers and become competent in the use of ICT applications such as word processors and spreadsheets. It might encourage them to use the technology to overcome some of the difficulties they meet in their daily lives.

2.2.10 ICT can offer new learning opportunities in education

Students who are developing their ICT capabilities could become increasingly confident in the two dimensions of thinking and doing. They will be able to develop

their skills in order to be able to select and use methods which are appropriate to the task in hand and identify situations where the use of the computer may or may not be relevant. It will give them the opportunities to become more able to reflect and comment on their use of ICT and begin to recognise how information technology affects the way in which people live and work.

Using ICT brings many benefits, particularly in terms of children's motivation. Speed, automation, capacity and range, revision and interactivity further increase productivity. These gains are not achieved over-night however, and teachers need to be patient and persistent in the development of innovation in the classroom.

The structure of teaching and learning may have to change to permit communication technologies to play as important a role in education as they do in commerce. More teaching and learning opportunities become available through electronic communications. ICT has changed the traditional teaching methods in China. Not only does the teacher interact with students through the use of ICT but ICT can also enhance a teacher's knowledge. Multi-media communications are also valuable in the training of student teachers. Communications skills will be more and more important as technical ICT skills in education develop. Educators will have the opportunity to communicate through global information superhighways using electronic communication and teachers will be able to support and help each other.

A country like China, which has only relatively recently started to introduce computers into schools, can learn from the experience of other countries like the UK where computers have been used in schools for more than twenty years. Above all,

these experiences can indicate to the leaders in China which initiatives taken in the UK have been successes and what infrastructure should be considered to avoid potential disillusionment. The Impact2 report from the UK is a large scale and recent report which examines the impact of ICT in the classroom and examines areas of strength and weakness and looks at the effect of the use of ICT on student attainment. It should make interesting and informative reading for policy makers in China.

2.2.11 Teachers supporting the ICT skills of the students

Teachers should not be distracted because of all these demands in the limited time available during the school experience. It is important to focus on key areas of planning and organisation with ICT which can be observed and evaluated with a small group of students and then developed. At first it is wise to focus on an area of curriculum strength in which there is already a great understanding of the knowledge, skills and concepts which form the framework for the activity.

What is important in the development of the novice teacher's understanding of children's ICT capability is the observation and evaluation of the ways in which children work on the task with the ICT resources, and the demands that are made of the teacher in terms of technical support, interventions and questions. The focus should always be on the quality of the children's experience.

The brain of the human being and the power of the computer should complement each other. Computers run at high speed and have huge memories and it is this capacity that can alleviate the burden of remembering so that students are free to focus on problem solving and developing their ideas.

It must be emphasised that the role of the teacher should not be undermined when ICT is used in teaching. Teachers can then use more of their energy to do research, for example on how to use information technology to support innovative and personal and social education. Innovative education can mean encouraging teachers to share their sources of information and jointly develop new approaches. Asking teachers to take advantage of these many sources means giving them the time, opportunity and encouragement to develop their skills and keep abreast of this ever-changing technology. Being able to use basic applications of word processors, databases and spreadsheets are useful activities for teachers as they involve the numerous skills needed when creating, storing and presenting information. It is advantageous for teachers to have an understanding of how data is stored and retrieved, knowledge of the limitations of computer systems, an appreciation of the importance of the interaction between computer systems and their users and an awareness of the social and economic consequences and implications of computer systems.

It is interesting to note that many of these skills were included in the first Chinese National Curriculum for computer science.

2.2.12 Group work and developing problem-solving skills and processes

In China, classes in schools are normally quite large, usually between forty and fifty pupils in each class. This is especially true in big cities. Computer lessons are very popular with the result that the key schools classes have fifty to seventy pupils in them. As a consequence of this computer classes are often separated into smaller groups. Within the class situation itself, when the teacher decides to create a group or set of groups to undertake particular tasks, it is critical that the process should not be

arbitrary. This was discussed by Wang Dazhong (2000) - an educator in Beijing Educational Institute, and director of Beijing University. He argues that groups should be formed in the following way.

1. Interest or topic grouping (The students have special skills, for example web design, computer programming skills, etc.)
2. Friendship grouping (Students who have good relationships can communicate better with each other.)
3. Developmental age grouping (Students who seem to have a bright future in computing or other fields.)
4. Special needs grouping (Disabled students may need special equipment.)
5. Age grouping (Most of the students who study in the same class are the same age but there maybe one to two years difference.)
6. Achievement grouping (Separated into three groups, high, middle and low abilities.)
7. Compatibility grouping (Dependent upon the teacher's knowledge of the pupils.)

Groups need to be small and should avoid the situation where one student does everything. The students should be independent and have their own ideas which they discuss together, improve together, and expand their knowledge together. Groups, after formation, should therefore be made familiar with the new approach to their schoolwork, one that is different from the usual classroom method.

Group work must be a necessary part of any enlightened view of the curriculum. This type of teaching of makes very different demands on the teacher from those of the traditional classroom. Because the class organisation is vastly different, group work cannot be done in rows of desks. Group work cannot take place under an authoritarian structure and the normal control structure is much more difficult to impose under these circumstances. Initially many teachers find this threatening especially when it is first introduced. The sphere of using ICT for problem solving will also be new to many teachers, both young and old.

Involving students in the engaging world of computer-based adventure games can make an important contribution to developing positive attitudes to problem solving and the skills needed to carry it out.

These are enormous changes that will have to be made in Chinese classrooms. Schools in China have become interested in the potential of ICT resources to provide for the need of particular groups or courses within the institution. Teachers use assessment as part of teaching and learning. Intuitively they assess students' progress and adjust strategies accordingly. Using new technology can make teachers anxious and can make assessment seem more onerous than it was in their specialist areas of the curriculum (see Section 6.2.1).

2.2.13 Internet

The Internet is a network of many computer networks connected throughout the world. They are all interconnected physically or by radio waves; capable of

communicating and sharing data between each computer in each network; able to act together as a single network.

While the Internet uses the technology of satellites and computers, the interconnection is done using currently available modems and telephone technology. The initial development of the Internet was based on text. However, there are several areas of development on the Internet and the use of the Internet as a tool for teaching and learning that move it even further away from the use of text. These are:

- *Audio;*
- *Video;*
- *Videoconferencing;*
- *Interactivity;*
- *Virtual reality;*
- *Access and equity issues;*
- *Information and research tool.*

(Forsyth, 2001, p. 87)

In the early days of the Internet, the majority of users were computer specialists or those working in universities; however, things have changed radically. Now millions of people are beginning to use the Internet at home or at school.

Before 1994 there was no Internet access in middle schools or universities in China; now, however, schools are using the Internet creatively to support their teaching and learning programmes. In most middle schools email addresses are available for all the staff and some students. The most common reason for any limitations on its use is the lack of computers. Typically, principals use email to communicate with teachers and other contacts in, for example, universities. Email is at the heart of Internet communication and a teacher who is experiencing difficulties in his or her teaching, can contact colleagues in this way to discuss their problems. Students can use email to ask their teachers' questions or send greetings to them on Teachers' Day. Students using the web to widen or deepen their knowledge of a subject should find that they

are better informed in any area after using the Internet which gives them access to a world wide store of information. They can then share their findings with their classmates and even their teachers.

Email allows students to communicate quickly and cheaply with the world outside the classroom. It also makes it easy for a class to make contact with other classes throughout the world; for example if they see web pages created by pupils at an another school and want to share ideas with them.

Students can create their own web page to display on the Internet. Creating a web page is in many ways just like using a word processor. Creating web pages only requires students to type in some text, download some pictures from the Internet and learn how to link their page with other pages.

2.2.14 The Internet as a tool for teaching

The Internet is an education in itself. Learning about a community and how it works, communicating with students across the globe and discovering niches of experimentation are all easily done using the Internet. It offers a very wide range of resources specifically designed for educational use. There are many programmes available on the Internet which claim to have some pedagogic value and, although educational software has often been boring and unattractive, multimedia technology can be used to make software more interesting with the addition of colour, graphics, animation and sound. However, it must be realised that many multimedia programmes are quite disappointing and do not make best use of the techniques available to them; sometimes they are just traditional textbooks transferred to the screen. Academic

establishments have a large number of sites on the Internet, so there is a vast pool of talent represented by the people and data available. When working with students who have special needs, the Internet can be used as a tool to support their learning as special devices and software can make the Internet as available to them as to their peers.

In the recent past much has been written about the use of the Internet in the classroom.

As Baner and Walter (2000) argued:

It is important when planning the use of the Internet not to lose track of the key principles that inform the development of all schemes of work within a school. In particular the following aspects provided the framework.

Teaching with the Internet should:

- *be incorporated into the total communication policy of the school. This includes the use of speech, singing, rebus symbols, written words and VOCA (Voice Output Communication Aids);*
- *be rooted in the concrete experience of students;*
- *enable students to access other individuals and groups through email and special interest groups;*
- *promote individual educational aims in the all areas (cross curricular);*
- *promote access to English (speaking and listening, writing, reading) within the curriculum;*
- *be used to support the application of the National Curriculum with other students in various curriculum areas;*
- *promote communication with individuals and groups outside school through developing writing skills. This involves following a process of: plan, draft, revise, proofread, present; communication skills; and making judgments about tone, style, format and choice of vocabulary as appropriate to the intended audience.*

(p. 24)

Although these guidelines refer to the UK National Curriculum, it can be argued that they apply to the curriculum at all levels of education in any country. They are a set of guidelines for good educational practice.

2.2.15 The Internet in China

According to the Ministry of Information Technology (China Daily, 01/07/2001), more than thirty million people were expected to have access to the Internet at home and at school by the end of 2001. Things have accelerated since then and, as the BBC news website on 2 September 2002 stated, Internet use in China was growing fast, and quoted the Chinese Government which said that 45.8 million people were then online. The same article claimed that Google had become the most popular search engine in China.

Another area of ICT use which should not be ignored is the presence of computer cafes in China. Currently, computer use is expanding rapidly in China and all the big cities and many small towns now have Internet cafes. In these establishments customers pay by the hour to use computers, scanners and other technologies and some of these cafes are open twenty-four hours a day. The obvious advantage of them is that a child or adult who has no access to a computer at home can use them. They can, if they wish, exchange their experiences with each other and perhaps find inspiration.

However the obvious disadvantage of these cafes is that some children will access unsuitable websites. This situation can be guarded against in schools by teachers but this cannot be done easily in cafes. Many parents and their teachers are aware of this danger and have appealed to the public authorities to prevent the children looking at unsuitable sites. As a consequence, the government has taken some steps to prevent access to sex websites in Internet cafes. Police visit cafes regularly to check whether or not they obey the rules and any cafes found to be in breach of the regulations are

closed or fined. Recent events have demonstrated that the government is determined to keep strict controls on the flow of information to its own citizens. Some 150,000 unlicensed Internet cafes nationwide have been closed in recent months and those remaining have had to install software that prevents access to up to 500,000 banned sites. The BBC reported in August 2002 that, for a short period, the use of Google was prohibited in China; however, it was quickly re-instated.

In the UK and the USA there are many websites devoted to the delivery of learning materials that can be used in the classroom. Many of the sites are free although some are subscription sites which schools have to pay to access. There are also numerous sites (some funded by the UK government) which have contents aimed at helping teachers with their work. These include lesson plans and chat rooms where teachers can exchange ideas and discuss problems. There is a website (<http://www.teem.co.uk>) where teachers can see evaluations of educational software made by other teachers, thus drawing on the experiences of their colleagues. There are some materials like this in China (<http://www.sina.com.cn>). Some websites are free for teachers to access for useful teaching materials, e.g. free teaching software and useful diagrams, etc. This kind of software is called class-software in China and some of the websites producing it are still in the early stages of development which means that, occasionally, the software cannot be used because of inherent technical problems.

2.3 Education and ICT in England

2.3.1 The ICT strategy for schools

One of the plethora of initiatives introduced by the British Government in its drive to raise standards in education was announced in 1998. This was to encourage the use of ICT in teaching and learning throughout the schools in the maintained sector. The focus of this programme was entitled the National Grid for Learning (NGfL) now known as the ICT in Schools Programme. Essentially the NGfL provided a network of information and learning materials and additional funding for schools through the Standards Fund. To embed this initiative a national programme of in-service training for teachers as well as librarians, who were thought to be extremely important to the effective collation and distribution of the new materials, was implemented. The funding for this training was through the New Opportunities Fund (NOF) from the National Lottery.

The Department for Education and Skills (DfES) was made responsible for this initiative and it forged links with the organisations and companies whose positive support was essential to the success of the initiative. The main participants in this were: the ICT industry, the Teacher Training Agency, the British Educational and Communications Technology Agency (Becta) and the National College for School Leadership.

Regional Broadband Consortia (RBC) were established in 1999 in order to provide an infrastructure for broadband connections to schools; the finance coming from central funds.

The government's determination to transform teaching and learning in schools by improving access to ICT and multimedia resources for all has led to the creation of the Curriculum Online website, which is in reality a vast online catalogue. It allows easy searching through a multitude of multimedia resources that schools can purchase with their e-Learning Credits (eLCs). The DfES distributed £330 million between 2003 and 2006 to school in England in the form of eLCs.

The DfES published its view of the future in the summer of 2003, 'Fulfilling the Potential: Transforming teaching and learning through ICT in schools'. In his foreword Charles Clarke, the then Secretary of State for Education and Skills wrote

Since being appointed Secretary of State I have made clear my commitment to shaping our policies so that they will unlock the value that information and communications technologies (ICT) can undoubtedly bring to education. My vision is one where schools are confidently, successfully and routinely exploiting ICT alongside other transformational measures. By doing so they will be delivering an education that equips learners for life in the Information Age of the 21st century.

(p. 1)

This was further emphasised by another publication by DfES in 2005, 'Harnessing Technology: Transforming learning and children's services'. The foreword was written by Ruth Kelly, Secretary of State for Education and Skills at the time. In it she wrote

Our plans for boosting performance and standards across education are far reaching and radical. We aim to put learners, young people – and their parents – in the driving seat, shaping the opportunities open to them to fit around their particular needs and preferences. In achieving these goals the effective use of interactive technologies is absolutely crucial and I am determined that we grasp them. They offer huge opportunities that we must exploit. It is our goal to work towards

ICT as a universal utility, creating more flexible learning opportunities for everyone.
(p. 2, 3)

These statements confirm the government's commitment to ensuring that ICT plays a pivotal role in delivering an effective curriculum to all learners and providing an almost limitless reserve of resources for educators. The government is steadfast in providing funding expressly targeted to deliver this aim. DfES funding for ICT in School totalled £657 million from 1998 to 2002 and in 2002-03 was £510 million. From 1998 to 2003 the NOF made £230 million available for teacher training in ICT. In England this was equivalent to £450 for each teacher and 96% of teachers signed up for the programme.

2.3.2 Use of ICT throughout the curriculum

Computers were first introduced in numbers into schools in England well over twenty years ago through a government funded scheme. Anecdotally, the computer, there usually being one or at best two in any school, found its way to the mathematics department where it remained an item of curiosity for some time until ideas filtered through as to how it might be used in a rather elementary way. Gradually computers were to be found in science departments for use in experiments and in design departments where computer aided design software was exploited. The growth of dedicated computer departments in schools soon followed, leading to public examinations in computing. Development of syllabuses in a new subject of information technology resulted in a surge in the number of students opting to study this new technology. Only recently, with the advent of the World Wide Web, the

Internet and affordable technology, has ICT found its way into other areas of the curriculum.

2.4 Summary

This chapter has detailed the background of education in China. Since the traditions of China and its education system are so different than those of the western world this contextual information is in some detail. This underlying understanding of the systems operational in China is important when interpretations of the findings and analyses are made in later chapters.

The next section of the chapter described the initiatives taken by the British Government to integrate ICT into the curriculum of schools. It shows the determination of the government to this change and the financial commitment it pledged to the process.

The next chapter will review published literature pertaining to the use of ICT in the classroom. The first part of the chapter looks at literature that refers to education in China; this is followed by a section reviewing literature from the UK while the final part of the chapter is a brief look at literature from other countries. The aims of the research have determined which literature should be included with the focus being the education of children in middle schools in China and secondary schools in the UK. The literature makes suggestions about the factors that support the successful integration of ICT in schools and covers what are perceived to be barriers to teachers using ICT in their teaching and learning methodologies.

Chapter Three

Literature Review

3.1 Introduction

This first section in this chapter reviews some of the literature concerning middle school education in China with particular reference to the use of ICT in the curriculum. Most of the research in China on education is focussed on universities; there are very few published documents on middle school education and little concerned with educational technology. In order to make a coherent survey, extracts from relevant passages from sections of reputable periodicals and addresses made at conferences are included. These extracts are from professionals in the field of education. Although there are restrictions in China on what can be published these have not been as strict recently and so there is reason to believe that the opinions expressed are genuine. The second section of this literature review focuses on the use of ICT in schools in England. There are reviews on how ICT is used in specific areas of the curriculum as well as looking specifically at the introduction of interactive whiteboards into classrooms. The chapter finishes with a review of the literature from other countries on the use of ICT in the educational curriculum of schools.

Throughout this chapter the aims of this research study have determined which literature should be included. The factors that lead to the successful integration of ICT

into the curriculum are explored as well as the barriers to teachers using it in their teaching and learning methodologies.

3.2 Review of the literature pertaining to China and the introduction of ICT into the curriculum of its schools

The cultural tradition of China, based on Confucian philosophy, is to seek the harmony of human order and of a society which emphasises the social roles and classes of individuals. Chinese citizens are encouraged to put their own interests second to the needs of family, employer and country. This tradition helps to form the highly structured pedagogical culture which is teacher dominated and based on large groups of students.

In his paper presented to the APEC Summit on Educational Innovation, Zhang (2004) concluded:

In order to achieve the widespread use and integration of ICT in education that can enhance sustainable innovations we need to adopt a systematic and holistic strategy that addresses the transformations of school cultures in China.

(p. 23)

The use of ICT is usually to support the traditional, examination focussed, didactic methods of teachers in China. The successful integration of ICT into the teaching and learning methodologies of the teachers will require enthusiastic leaders of vision to change the traditional approaches.

The views of Wang (2001) on how to integrate ICT into education are worth consideration.

Current thinking seems to be that computer studies classes should be cancelled as soon as possible in Chinese primary and middle schools, and more attention and more money should be focussed on using computers across the curriculum.
(www.etc.elec.bnu.cn)

This idea could be considered as being controversial in order to gain attention. However, even if this is the case it has brought the concept of ICT being used across all curriculum areas into focus. Certainly computer studies classes as such are not essential but formal opportunities in which all students are able to develop their technical skills in using ICT are advantageous. This will alleviate the problem of teachers of other subjects having to do this as part of their lessons before being fully able to engage the class in a planned activity that involves the use of ICT.

There is a wide disparity in the quality of education available in the large cities on the east coast of China to that in the countryside and in the poor western areas of the country. The government is trying to give all children equal opportunities in their formative years. In their report on using ICT to improve the provision of basic education throughout China, Crichton *et al* (2006) comment:

ICT's potential to serve as a powerful tool for this purpose hinges on having vision and strategies that align with international best practice as well as being context relevant and sensitive to gender and minority issues within China.
(p. 18)

The aim is to give teachers and schools the expertise and the necessary ICT equipment to effect the changes needed to give children in the deprived areas of China an improved basic education.

3.2.1 The role of the teacher

Using computers in education has often changed teaching methodologies. That this will impact on the training offered to prospective teachers is not in much doubt. However, there will probably have to be a change in the attitudes of teachers to their traditional role in the classroom. This is likely to have a greater impact on serving teachers than on the ones about to enter the profession. In his keynote speech to an International Conference entitled Preparing Teachers for a Changing Context held in Beijing, Gu (2006) argued:

Today the independent normal education system (for teacher training) could not serve the needs of scientific, technological and economic development in China. Thus, Chinese teacher education is experiencing a transition. They (teachers) need to integrate ICT into the curriculum, and improve the educational quality through systematic instructional designing, effective utilising resources, and scientific assessing and evaluating.
(p. 1)

This will involve teachers making the right adjustments to incorporate new technologies in their teaching. The teacher thus becomes not only an instructor but also a designer of teaching. The students gain knowledge by themselves with the teacher correcting them or discussing their problems with them. Computers also give the students the chance to embrace a vast amount of information, and in some fields they may come to know more than their teachers. An emphasis should be placed on the learning skills that students develop as they progress through their education.

Teachers should make the students aware of these skills and give them opportunities to develop them themselves, or in co-operation with others, using ICT where appropriate. This idea of students co-operating on their work is also a new concept in the Chinese classroom where typically children were made to work on their own. It should be quite natural for the students to take this idea of co-operation and corporate responsibility out of the classroom and use it in other aspects of their lives.

3.2.2 ICT supporting the teachers' work

ICT can help students make better sense of their school experience. It is a teaching aid and tool since the software helps the teacher to present lessons with certain educational objectives in mind. It is a tool in the hands of the teacher for achieving those objectives. Teachers have always used a variety of teaching aids, but few have been as flexible as the computer with appropriate software. Herein lies a problem at the moment; this is the availability of good quality educational software. The size of this problem is suggested by Zhang (2004):

The lack of usable educational software is one of the most important problems that constrain the educational use of ICT in China.
(p.11)

This was also one of the findings of a survey undertaken by Liu *et al* (2002)

Lack of content is the major obstacle in utilising high technology in education. Innovative programmes and curricula should be designed to help teachers build up a sound theoretical background and provide them opportunities to practice ICT based instruction.
(p. 27)

It is possible that this changing emphasis in the teachers' teaching and learning methodologies will have an impact on the way the lessons are conducted. The classroom organisation needs to afford the children opportunities to work with a variety of media over a period of time in a range of activities.

The traditional teaching method has been to use a variety of oral and visual techniques and to employ modelling stimuli, but now teachers can support their own personal and professional work with the use of ICT. By using ICT to develop teaching and learning materials, teachers have the opportunity to change their role from a conduit of learning to a learning coordinator.

The lack of suitable training opportunities for teachers has been highlighted in other countries as a problem for the effective integration of ICT into the curriculum. The situation in China is no different. As Zhang (2004) observed:

There needs a model shift from technique oriented training to integration oriented training that strengthens the educational uses of ICT. It is of great importance to build up a sustainable mechanism to provide teachers with ongoing supports.

(p. 15)

ICT has been used as a support for the traditional didactic teaching methods in China. There is a move to change this to an approach where ICT is incorporated in the teaching and learning methodologies of the teachers.

The report by Crichton *et al* (2006) was critical of areas of some of the training opportunities available for teachers. In particular, one of the issues identifies was that:

In-service training is focussed on passing a skills based examination and gaining a certificate rather than acquiring practical skills for the classroom.

(p. 9)

Some comments made by teachers when being interviewed (see Chapter 6), as part of the process of collecting qualitative data for this research, were about the payment of end of term bonuses to teachers. It appears that these are given for achieving specific standards in certain areas of their teaching. One of these elements is using ICT in lessons and gaining accreditation for this part of their work.

Teachers have to play a vital role in the integration of ICT into the curriculum of schools. Without adequate support and training the task they face is difficult and it is possible that the result would be a superficial use of ICT merely as a tool rather than be fully absorbed into the pedagogies of teachers.

A specific example of this change in pedagogy can be found in the use of ICT in the teaching of music in which Ho (2007) made a study in schools in Shanghai.

The findings suggest that the use of ICT could extend the boundaries of music learning in the classroom, giving rise to a multitude of new and exciting possibilities. This approach to curriculum formulation is argued to be significant in terms of developing students' technological literacy and providing rich learning environments that make use of computer-mediated communications and the effectiveness of technology and teacher fidelity in implementing pedagogy.

(p. 699)

The schools in this survey used ICT predominantly for listening activities; however, the students thought that this could be extended to learning different styles of music.

The situation in the teaching of mathematics is similar in the sense that once some technology is in place the problem is how to develop its use in the classroom. This is what Gao *et al* (2005) found when surveying how ICT was used in the mathematics curriculum.

After the software and hardware are available for the teachers, it is still a problem on how to use these technologies to improve teaching. The simple or direct usage of technology is presentation. But the teachers do not think that meets all their needs. They hope that the system can be a tool related to the curriculum and have the power of doing reasoning and other mathematics operations.

(p. 3)

The installation of the latest technological equipment is only the first step in empowering teachers to integrate ICT into their teaching and learning methodologies. The opportunities for them to experience ongoing specific training and the supply of faculty orientated good software will be important if teachers are going to have the equipment, skills and confidence to venture further in incorporating ICT into the curriculum.

3.2.3 ICT used in the administration of schools

There has been an increase in the use of information technology in educational management in schools in China. This is especially important in a country where education is focussed on the examination results of the students. The bonus payments made to teachers also are in part determined by the results achieved by their students and these results affect the ranking of the school. A recent survey of the use of this technology in management was carried out in Taiwan by Selwood and Tang (2007). They found that its introduction had been well received by teachers who had experienced improvements in communications and access to a wide spectrum of data

since its introduction. However, it was reported that only 20% were using ICT for monitoring the progress of students. There were concerns expressed by teachers about training and equipment.

A very large majority (of teachers) felt they needed more training to improve further their skills and use of ICT for administration and management. There were some concerns regarding the need for sustained investment in infrastructure and training if the use of ICT is to grow and play its full part in school improvement.
(p. 53)

Although the concerns described above are real the overall impression given by the teachers is that they have welcomed using ICT in management and have positive views about using it in the future.

3.3 Review of the literature from England

The researcher has availed herself of the many documents published by the British Government in its quest to fully integrate ICT into the curriculum of schools in the maintained sector. There have been many studies undertaken by government funded agencies such as the Office for Standards in Education (Ofsted) and the British Educational Communications and Technology Agency (Becta) into the effectiveness of various ICT initiatives promulgated by successive Ministers of State for Education. All these sources of information have formed the foundation for the literature review which subsequently included publications from independent researchers. The review of this latter large pool of work undertaken by professionals completely independent of the government has been vital to ensure the unbiased nature of the final summaries and conclusions.

The review of the literature and the ensuing collection of relevant evidence were focussed on four distinct areas. These are:

- (1) factors affecting the integration of ICT into teaching and learning,
- (2) use of ICT throughout the curriculum,
- (3) interactive whiteboards in the classroom,
- (4) impact of ICT on whole-school development.

3.3.1 Factors affecting the integration of ICT into teaching and learning

Research into the effectiveness of the government's initiatives in introducing ICT into schools has been undertaken by Ofsted. This work began in 1997 and reports have been published in May 2001, April 2002 and May 2004. The latest report, 'ICT in schools: The impact of government initiatives five years on' (HMI 2050), is based on visits to secondary, primary and special schools, LEAs and RBCs. These visits were made by Her Majesty's Inspectors along with Additional Inspectors and were undertaken between April 2002 and December 2003.

The main findings are, on the whole, positive. The competence of staff has increased dramatically since 1997. The spread of ICT as a tool for teaching and learning has continued at a slow, but steady, rate. It can be said that ICT is now recognised as an essential tool for learning in the twenty-first century.

However, the gap between the best and worst ICT provision in schools is unacceptably wide and, even more worrying, this is increasing. The government's aim that ICT should be embedded in the work of schools is a reality in only a small minority of them.

It is also shown that there is a clear place for pupils' use of ICT simply as a medium for learning. In this context the role of the teacher becomes even more significant with the combination of human and computer interactions being the telling factor.

(HMI, 2004, p. 4 – 8)

This is a cautionary report that displays an acceptance that ICT is acknowledged as being an important contributor to education and yet there seem to be major obstacles to its effective integration into the curriculum. To have only a small minority of schools that fully encompass ICT is very disappointing. Although making laptops more easily available for teachers has had a positive effect, few schools make any significant use of available broadband connections. While efficient technical support gives confidence to the users of ICT it is lacking in many schools and continued professional development has often been severely disappointing. It is not surprising that the variable standard of what many would assert as being essential requirements for the confident use of ICT in the curriculum has led to such a differing expertise of ICT shown by schools and teachers.

In their study, McCormick and Scrimshaw (2001) maintain that traditional approaches to the use of ICT in education have given insufficient attention to its impact on the classroom.

In particular, those responsible for initiatives must be clear about what they are trying to do with ICT and, crucially, why they want to use it in a future approach to curriculum development. Attention needs to be given to the effects on pedagogy, leading to the implication that such initiatives are effectively curriculum change and so has to engage with fundamental views of learning, knowledge and pedagogy.
(p. 37, 54)

The inference being that leaders and policy makers should have a vision that is not only achievable but which can, by their enthusiasm, be transferred to the curriculum in schools and the teachers who are tasked with delivering it. There is little doubt that the possible changes involved in this process could be fundamental and it suggests

that an investment in the delivery of an effective programme of continued professional development is important.

A valuable assessment of the present situation is contained in The Becta Review 2005: Evidence on the progress of ICT in Education (Pittard, Director, Evidence and evaluation).

Although most establishments use ICT as a management tool this is usually for data entry and collation and misses the opportunity to use it for data transfer and analysis to support planning. Schools are very much at the embryonic stage of developing network technologies to facilitate learning beyond the institution.

(p. 4)

This review confirms that only a small minority of schools have fully integrated ICT into the curriculum. There is also a suggestion that the use of information technology in educational management is not being fully harnessed to make use of the wealth of data available in schools to track and plan the progress of individual students. Some software packages have facilities to do just this but there may be problems with training and time that prevents them being fully exploited.

It is of great importance to be able to monitor the development of ICT use to support attainment in institutions over time. Stevenson *et al* (2004) studied appropriate measures to achieve this goal. The work covered attainment connected to curricular knowledge, ICT skills that enable the processes associated with developing this and personal factors, which include the development of self-confidence, motivation, autonomy and collaboration.

We found that the activities with the greatest potential for developing attainment were those: that had clear outcomes and were carefully planned, using ICT appropriately; where learners had the necessary ICT skills for the activity; where learners had the opportunity for sustained work using ICT, either on their own or with other learners; where leaders were skilled in engaging learners in reflection and analysing their own work with ICT, both informally and with whole groups.

(p. 4, 26)

The factors listed in this extract are similar to the traditional format of lesson plans but with ICT as an added element. This is to be expected in a curriculum in which ICT has been embedded successfully. However, in order that the potential might be converted into practice, the ICT skills of the pupils should be adequate for the tasks they are involved with, and, probably more importantly, the teachers have the confidence and expertise to use ICT in this setting.

It has long been a worry for many professionals that the increasingly prescriptive nature of the national curriculum has been restrictive to teachers which, in turn, has led to some pupils being ‘turned off’ education. To some, ICT is seen as one way to re-engage students. Research to investigate the impacts of ICT on pupil motivation was undertaken by Passey *et al* in 2004. They found that:

The use of ICT by pupils and teachers led to positive motivational outcomes, supporting a focus upon learning and the tackling of learning tasks. More positive motivation resulted when ICT use was focussed on both teaching and learning, than when it was used to support teaching alone. Positive motivational outcomes were most frequently found when ICT was used to support engagement, research, writing and editing and presentation of work

(p. 3)

A sample of seventeen schools where positive motivational impacts of ICT had been identified by external observers was selected for this detailed study. There was no evidence that ethnic or cultural differences or that of gender had any noticeable effect on the motivation of students. It should give encouragement to teachers trying to use ICT in their methodologies to know what positive effects it can have in the classroom. As a cautionary note though, the focus should be on both teaching and learning.

Strategies need to be found in order to integrate ICT into the whole curriculum of schools so that it becomes positively embedded into teaching and learning. Scrimshaw (2004) published a report seeking to analyse factors for success and make recommendations that will help teachers.

At the individual level of the teachers themselves the factors aiding the integration of ICT were identified as including: a personal laptop, high level of technical support, and availability of good quality training. Success at the whole school level was dependent upon: on-site technical support, programme of ICT training for staff in place, wholehearted support and vision for ICT from senior management.
(p. 9, 10)

The main findings of this report are from an extensive review of available literature reinforced by a small scale survey. The survey was, however, unrepresentative in that it was opportunistic and simply asked visitors to the Becta research website to complete a questionnaire. Since most visitors to this site would view ICT positively it would more likely elicit favourable responses. Notwithstanding the potential bias from the survey element of this report, the findings are supported by other literature reviewed in this section. It identifies the need for teachers to have confidence in

themselves, the equipment they use and in the support of management to use ICT successfully.

There have been difficulties in promoting the integration of ICT throughout the curriculum. Becta (2004) reported its findings on why the introduction of ICT into the curriculum has been so varied throughout the country and why a significant number of teachers have been reluctant to fully embrace this technology. Among the problems highlighted were:

Teachers with little or no confidence in using computers will try to avoid them altogether; confidence is directly affected by the amount of personal access to ICT, the amount of technical support available, and the amount and quality of training available.

(Jones 2004, p. 3, 4)

This should come as little surprise to most professionals who are concerned with the delivery of education. The Government has gone some way towards resolving the personal access teachers have to computers with the 'laptops for teachers' scheme. However, there still remains the problem of effective professional development for teachers in the area of ICT. Although extra funds have been provided for in-service training some reports suggest that its quality is too variable to engender confidence. As with any new technology the fear of faults developing is often present among those using the equipment and, added to the need to be in control of a class of students while attempting to solve them, is a disincentive to using ICT. If enough time were to be made available for teachers to plan the integration of ICT into their lessons and to explore the advantages it could bring them, then more might be encouraged to use it.

It is not surprising that the conclusions reached in the last two extracts are very much complementary to each other. Institutions adopting an approach comprising, as a basis, all the salient factors outlined in Scrimshaw's work (2004) will perhaps have overcome the vast majority of the barriers indicated by Jones (2004).

From the outset it was evident that lack of personal access to a computer was a major difficulty for teachers striving to use ICT in their teaching. In order to try to overcome this, the DfES launched the Laptops for Teachers initiative in the spring of 2002. In the first two years of the scheme the government provided £120 million to Local Education Authorities for the purchase of laptops. This had an immediate impact on the teaching profession as was shown by Cunningham *et al* (2003). Their conclusions included:

In particular, teachers have been able to access the Internet more readily and create their own up-to-date, high quality, resources more easily via their laptops. The laptops have encouraged the exploration of innovative approaches to lesson delivery. Teachers reported that they had become more confident and competent in their use of ICT since having their laptops and were prepared to adopt an increasing range of motivational teaching approaches.
(p. 35, 36)

It is disingenuous to claim that simply the provision of laptops to teachers has brought about these positive changes. The teachers themselves have found the time to familiarise themselves with the equipment and explore the possibilities of using it in their teaching and learning programmes. It is likely that many have also taken the opportunity to attend in-service training courses. It is surely the combination of these factors that has made it possible for more teachers to use ICT effectively. The funding for laptops for teachers did not extend to providing one for every teacher and

therefore there will still be some who are deprived of the opportunity to use ICT in their teaching.

Edmondson (2002) was responsible for the teaching, installation and embedding of ICT in her school. Her research into and personal experiences of this process gives a valuable insight of what she found to be the main elements on which to build. The key recommendations are as follows:

Training is most successful when it is delivered at school and focussed on skills that are relevant to teachers' everyday lives. Successful training needs to be well led and there needs to be a supportive learning culture amongst the staff; mutual support of the staff is not only incredibly effective but also economical. The most significant element for continuing the development of teachers' skills is for them to have their own laptops; these, in conjunction with the interactive whiteboards, have the greatest impact on enhancing teaching.
(p. 2)

There is a marked emphasis on good quality in-service training that is directed at the individual needs, personal and professional, of the teacher, held in a familiar environment and in the company of supportive leaders and colleagues. These conditions are rarely met when courses are held at training centres or hotels. The findings again fully endorse the government's strategy of making laptops available to teachers.

During the autumn term of 2003 Kitchen and Finch conducted a survey of schools in England to evaluate the use of the Curriculum Online website.

Curriculum Online has achieved high levels of awareness among school staff, although it may be of concern that as many as a quarter of

teachers were still not aware of it. The findings indicate that Curriculum Online has made a positive start, although it still has some way to go before it can be regarded as the default option for teachers wishing to access curriculum related software.
(Kitchen and Finch, 2004, p. 46, 47)

Curriculum Online is a government educational catalogue that allows easy searching through a multitude of multimedia resources that schools can purchase. The Government has given schools money in the form of credits (eLCs) which can only be used for purchases from Curriculum Online. The website is reasonably well known among school staff but as yet it is not seen as the obvious place to look when buying educational software.

There appears to be an emerging market for curriculum related software and publishers have been quick to seize their chance to market software applications directly related to the popular course text books in the major subjects; these often come with financial incentives for the purchaser. Curriculum Online is in the market place and finance might be a factor in its not yet being used extensively.

Published in 2004 was another evaluation of Curriculum Online undertaken by Dixon *et al* (2004). Their findings broadly reflect the previously quoted publication in that they conclude:

Curriculum Online has made an important contribution by allowing schools to make significant investment in digital content resources and that there was evidence that schools were using these funds to extend the use of ICT to previously under-resourced areas.
(p. 6, 7)

Both these evaluations report an increased use in schools of ICT in the curriculum. However, apart from the buying power given to the schools for its use, it is unlikely that Curriculum Online was a major factor in the increase.

The role headteachers and principals have to play in the integration of ICT cannot be understated; in short, it is important that they display enthusiasm and vision if the process is to be accomplished successfully. In his paper presented to the IFIP Working Conference held in 2003 at the University of Melbourne, Kendall formulates the case succinctly.

Effective school leaders are key to realising teaching environments; the actions of individual teachers will have an effect for a short period, but are not sustainable. When sustainable impact is considered, it is clear their provision needs to start with people and culture. Hence, the realisation of a teaching environment for the teacher of the future will engage effective school leaders in leading teachers within their school.
(p. 2)

The ethos of schools should be determined by the vision of the headteachers of those schools in partnership with governing bodies and the staff as a whole. The part governing bodies play in determining the direction and success of a school ought not to be understated. The successful implementation of ICT into a school curriculum will require a positive contribution from the governors in supporting the headteachers and teaching staff.

Although the benefits of the use of ICT in schools are generally accepted, how these can be achieved is more difficult. Lack of an established pedagogy in some subjects

and a lack of understanding of how ICT can energise students are just two of the perceived problems. In his research, Newton (2003) concludes:

The managerial functions of planning and orchestrating lessons need to embrace the new opportunities offered by ICT; in this sense ICT can augment teachers' existing skills.
(p.19)

If teachers are to be able to identify how ICT can be used in certain aspects of lessons to add to the students' experience and so improve the learning outcomes then the basis for using the technology is established. They can only do this if they have had adequate training on the use of ICT and a chance to see an established example of good practice in their subject area. The problem of management in Newton's comments could be seen as one of insufficient focussed and subject specific in-service training being available.

3.3.2 Use of ICT throughout the curriculum

For students to be fully prepared for life after school, teachers should take on board new technological advances, finding out what it can do and striving to make this technology work to its full potential. Evidence shows positive effects of using ICT on students' attainment in almost all the National Curriculum subjects. A report published in 2004 by the Fischer Family Trust suggested that there is strong qualitative evidence for a link between e-learning and improved examination results at GCSE.

Wegerif produced a report in 2002 about thinking skills.

ICT is best thought of as a support and resource for dialogues in which thinking skills are taught, applied and learnt. The computer as a tutor and as a tool can both be ways to support and resource such learning conversations.

(p. 3)

ICT in the form of tutorial software can be used to promote discussions between the students and so encourage the development of their thinking skills. In this way the technology is being used to support, not lead, the interactions of the students.

Notschool.net is a project to give students who are out of school in the long term, and have no links with their past school, a computer and broadband connection linking to a support network of experts and other learners. Research of the project undertaken by Heppell (TES, 2004) has found that it has resulted in the students' ICT skills being accelerated along with increased motivation and engagement.

Research into the use of ICT in English, history and science was undertaken by Goodwin and Findlay (2003). They found:

There is a need for more subject specific examples of innovative practice to be made available to teachers who are receptive to new ideas but are not always afforded the professional development opportunities to meet their needs.

Training in ICT should recognise teachers' pedagogical orientations and beliefs about their subjects and be aware that this influences the ways in which they integrate ICT into their practices.

(p. 28)

Concern has been expressed previously about a perceived lack of suitable opportunities for the continued professional development of teachers. For those teachers who are just finding their way with ICT in their teaching methodologies, it would be appropriate for in-service training to be directed at their specific subjects in which they are already competent. It seems reasonable to suggest that those who view ICT positively will be able to develop their ICT capabilities within a familiar curriculum area. The research suggested that subject cultures, in the three subjects surveyed, had a significant influence on the use of ICT. While history teachers did not perceive any change in the pedagogical practices through using ICT, science teachers experienced change and English lessons involved a higher percentage of time using computers and working collaboratively.

It should be of some concern to policy makers that, in spite of initiatives recently made by the government, along with associated funds and resources, the uptake of ICT into the curriculum varies so widely from school to school. One facility to reduce this disparity is that of video conferencing. Gage (2003) has explored the feasibility of using this technology as part of a normal lesson with positive results.

The technology added to the pupils' motivation and provided a sense of excitement which is not normally a feature of mathematics lessons. The level of confidence of the pupils increased, although some expressed feelings of considerable embarrassment. Video conferencing contributed to opportunities for genuine collaboration and it can also be used to facilitate observation of good practice and to bring good teachers to a wider range of pupils.
(p. 59, 60)

While it is likely that teachers of mathematics may take exception to their subject being specifically mentioned, the comments made in Gage's work could probably be

made about other subject areas. An important aspect of video conferencing was the apparent enthusing and increasing confidence of the students, albeit with reservations concerning the possible embarrassing effects it could have. However, the use of the technology to give teachers and students the benefit of good practice should be viewed positively. That the technology exists to disseminate good practice within a school can lead to speculation that it could be extended to a consortium of schools and one which need not have geographical limitations. There should be benefits for all concerned at this possible extension of video conferencing.

The British Government's Specialist School Initiative has meant some schools being given Technology College status. Their priority is to become an ICT-rich centre of learning for students and the wider community. Terrell and Capper (2003) have undertaken a four year project to assess the progress made at one such school. The first phase, from September 2002 to July 2003, looked into 'creating a template for change'.

The initial findings from the study indicate that teacher engagement is critical to pedagogical and cultural change. The pace of change is supported by infrastructure and availability of new technologies and resources. The use of the new technologies to facilitate communication and exchange of ideas is much more immediate, widespread and permanent than traditional approaches to educational development.
(p. 25)

It has to be borne in mind that this study was made of the implementation of ICT in one school. However, other schools were also given this Technology College status and operate under similar systems and with the same priorities. It seems not unreasonable to suppose that, in general terms, the positive findings of this study, but

with different timescales, will apply to the other schools with the same status. If the benefits of this ICT based educational development can be sustained then there could be an argument for making it even more available to other schools.

The NGfL portal funded by the Department for Education and Skills and launched by the government in 1998, draws together a variety of websites offering links to quality assured internet resources that are useful to those who are in mainstream education, learning informally or educators. Already in 2003, there were over 900 websites linked to NGfL. One area of the portal is specifically designed for teachers with its contents having been assessed by qualified teachers. In addition to website links it has news and features relating to education as well as information about forthcoming events.

ICT can be used effectively and imaginatively in all subjects studied in secondary education. QCA and Becta have produced a series of documents offering guidance to subject teachers on ways to use ICT in their lessons. As an example from 'Entitlement to ICT in secondary English'

ICT has fundamentally altered the way we communicate and how we think about reading and writing. As a medium and a tool, it promotes the integration of the skills required by the National Curriculum in secondary education and extends pupils' ability to exercise choice, work independently and make connections between their work in English and other subjects.

(Becta ICT Advice, 2003, p. 1)

ICT can help students access materials from many sources, annotate text imaginatively, manipulate and edit their own writings and communicate and collaborate easily with others.

Many students in England do not have English as a first language and, consequently, are said to be learners of English as an Additional Language (EAL). Most EAL specialists use curriculum related websites to develop students' English in contexts that students can use to consolidate their knowledge, often in small groups collaborating on projects with a specific focus. In this way ICT can have a real impact on learning with teachers no longer being limited by the physical, linguistic and cultural resources of a single classroom.

The nature of mathematics has changed because of the availability of ICT. The processes of modelling, validating, hypothesising and finding information are becoming increasingly important and are made accessible by this technology. The interpretation of graphs is important in the mathematics curriculum. Research suggests that the use of a spreadsheet application was more effective than having to draw the graphs by hand where much of the industry was in constructing the graphs rather than interpreting them.

Art departments generally have been inventive in their use of ICT. Research into artists and techniques can be undertaken by students using the Internet more easily than searching through the school's library which will be limited in content. Digital art can be explored by using digital cameras and scanners and computers can encourage self expression and experimentation.

3.3.3 Interactive whiteboards in the classroom

The development of sophisticated and yet affordable interactive whiteboards has seen them rapidly becoming a common classroom resource. In 2004, as one of a series of publications about ICT for schools, Becta produced a document extolling the use of interactive whiteboards.

Incorporating this technology enables teachers to encourage and develop active learning while extending a range of teaching styles essentially laying the emphasis on whole class teaching strategies. The technology increases the interaction between teachers and pupils with all the students being able to focus on the central point in the classroom.

(p. 2, 3)

There is specific software available for many subject areas for use with interactive whiteboards, but teachers with more confidence in using ICT are creating their own. It is possible to do this at a basic level by using a PowerPoint application with information from the Internet. The potential for engaging the whole class in a productive and visually dynamic lesson is apparent. However, the confidence of teachers to embark on incorporating this technology is important if success is to be realised. A genuine programme of in-service training directed at the use of interactive whiteboards in specific subject areas should see them being used effectively over an acceptable timescale.

The interactive whiteboard can be thought of as the gateway to the Internet and, as such, can give access, in a whole class situation, to the vast accumulation of information that it holds. It also enables students to communicate and collaborate on projects with other students of all nationalities throughout the world.

The Schools Interactive Whiteboard Expansion initiative was one of the first organisations to contribute to the Government's 'The London Challenge: Transforming London Secondary Schools' launched in May 2003. The aim was to increase the provision of interactive whiteboards in that region to develop and enhance effective pedagogy using ICT and demonstrate that they can make a significant contribution to embedding ICT in the classroom.

Miller and Glover (2002) investigated the use of interactive whiteboards in five elementary schools in England.

Potential benefits in the introduction of interactive whiteboards as an integrative technology within schools were found when the following conditions were met.

There had to be a will to develop and use the technology. This stems from enthusiastic staff prepared to develop the necessary materials and convince the headteacher, senior staff, colleagues and governors on the pedagogical benefit of this technology to teaching and learning.
(p. 18)

These findings accord in all aspects with elements which are seen to enable successful integration of ICT into the curriculum in the previous section. A study of the use of interactive whiteboards was undertaken by Levy (2002). She found encouraging evidence for the value of interactive whiteboard based teaching.

Teachers are already using the interactive whiteboard in creative ways that are compatible with, and supportive of, their educational aims. Confirmation was found of the importance of staff training activities that extend beyond basic teacher training even early on in the use of this new technology. Teachers need to feel confident about technical matters, but also need opportunities to explore broader pedagogical issues from the outset.
(p. 16, 17)

The data for this study was collected from two schools in Sheffield. Although the study base is small, the interpretations do not reveal any concerns about the use of interactive whiteboards in the schools surveyed. Therefore, it seems reasonable to suggest that the conclusions arrived at should be generalised to other schools. The difficulties encountered were similar to those remarked upon when integrating ICT into the curriculum. Technical malfunctions, limited access and lack of time to develop resources were all mentioned as giving problems, as was the situation regarding specific training and support. Given ways of overcoming these problems it appears that many teachers were using interactive whiteboards creatively. It was reported that the students appreciated and responded positively to this new technology.

Evidence for the positive role of interactive whiteboards in the curriculum was found by Davidson and Pratt (2003) in their research.

This research highlights the need to focus careful attention on the pedagogy required to use interactive whiteboards successfully. They appear to have immense potential to enhance both motivation and conceptual learning.

(p. 33)

To give teachers confidence in the methodologies they employ in the use of interactive whiteboards it is recommended that a framework is needed in which the pedagogy associated with their use can be discussed. The research showed that if sufficient training and resources were available most teachers welcomed the introduction of this technology.

The financial outlay in establishing a system of interactive whiteboard teaching and the associated training requirements cannot be underestimated and the strain on a probably already overstretched budget could be great. However, the findings from all the literature reviewed suggest that the educational benefits would merit a planned investment in interactive whiteboards.

Becta (ICT Advice, 2003) produced a series of publications in 2003 to give advice and guidance to the management and teachers in schools on the introduction and integration of interactive whiteboards into the school curriculum. These ranged from guidance on planning the purchase through to its effective use and the sourcing of appropriate materials.

3.3.4 Impact of ICT on whole-school development

It must not be forgotten how ICT can improve record keeping which in itself could lead to better informed planning, teaching and learning. Recording information is just a start, to be of intrinsic value this data must be analysed and appropriate action plans determined. A study into how management information systems could be used to support practices leading to enhanced achievement was conducted by Passey and Madsen (2007).

Management information systems can provide a key means for schools and teachers to handle, review and monitor formative assessment data. National policies will need to consider the entire range of challenges, if teachers are to use management information systems to support and enhance learning achievement effectively.
(p. 99)

That formative assessment can be used by teachers to enhance students' attainment is recognised but, as yet, there is no standard management information system established in schools to realise this potential on a national scale. Management information systems are in use in many schools to monitor its finances as well as pupil attendance and record keeping. Schools are now attempting to extend the educational record keeping to capture all the information held by different departments in the school such as tutors and class teachers. With sophisticated systems this data could be used to individually profile each student and develop individual study plans that will meet their educational needs.

The relatively new concept of learning platforms has entered education. This is a generic term to describe a broad range of ICT systems which are used to deliver and support learning. It normally combines several functions, such as organising, mapping and delivering curriculum activities and the facility for learners and teachers to have a dialogue.

The term learning platform can be applied to a virtual learning environment or to the components of a managed one. Becta (An introduction to learning platforms, 2005) found that there are many benefits to using learning platforms.

A learning platform will enable parents to support learners and engage with wider school activities, enable those with leadership responsibilities to reduce administration and communicate easily with parents and enable the learner to extend learning beyond the classroom and manage personalised learning.

(p. 3)

The learning platform is a logical development of a management information system as applied to student record keeping of an educational nature. However, if it is to go beyond the classroom and travel with the student to give opportunities for life the systems used ought to be compatible from school to school and area to area. Given the diversity of systems used throughout the education sector an agreement to a one standard for all environment would appear to be a discussion for the future.

Although the survey undertaken by Tearle (2003) was very limited, its findings are of note.

What emerges then is not an argument as to whether equipment, support or training is the more important, but a much broader debate about mindsets, assumptions, beliefs and values of individuals and organisations. It almost certainly means, however, that piecemeal approaches which address discrete elements which are perceived to impact on increasing ICT use will, at best, have limited outcomes.
(p. 581)

These comments come back once more to the ethos of a school and the vision of its leaders to create a culture where change is viewed positively and where collaboration is valued and people are receptive to new initiatives.

3.4 Literature from other countries

A study of teaching-learning characteristics and the role of the teacher in ICT learning environments was made by Smeets and Mooij (2001) in which they surveyed schools in five European countries.

Teachers need to create learning environments that are adapted to the needs, abilities and interests of individual pupils, thus stimulating pupils to be active, to co-operate and to take more responsibility for the learning process.
(p. 416)

The idea proposed by this study is that of ICT enabling the teacher to become a facilitator in the classroom. ICT can be used to promote a student centred learning environment when there is differentiation in the individual programmes of study. This aim suggests a programme of continued development for teachers in this area will be required.

A survey of relevant factors for the successful integration of ICT in education was undertaken by Granger *et al* (2002). The study was of schools in Toronto, Canada, and their conclusions were similar to comparative investigations undertaken in the UK.

The factors contributing to schools' success seem to be computers, commitment and community. Clearly, a lack of appropriate material resources inhibits learning and causes frustration and resistance in school communities. Further, full-time technical support and significant opportunities for teacher education in ICT are as necessary as up-to-date equipment if teachers are to move toward curricular integration.
(p. 487)

The conditions for ICT to be successfully integrated into the curriculum were very similar across all the schools surveyed and, it must be said, similar as well to the interpretations of the surveys undertaken in England that have been mentioned earlier in this chapter. In order for ICT to be used effectively in the classroom the confidence of the teachers is paramount. Reliable technical support and opportunities for focussed in-service training are very important in giving teachers this confidence.

The purpose of ICT in education is connected with the aim of giving pupils greater responsibility for their own work. That this transition from the traditional is not all that easy to achieve is reflected in the very cautionary work of Jedeskog and Nissen (2004), who made an empirical study of work with ICT in nine schools in Sweden.

Pupils engage in searching on the net; often, it seems to the observer, without much of a meaningful result concerning subject knowledge. When neither pupils nor teachers have sufficient control over how to handle the information gained via ICT, the process of transferring responsibility seems to end up in a situation where 'to do' receives more attention than 'to understand' with the hope that as long as the pupils are occupied in front of the computer there is a chance that they might manage their own learning process.
(p. 43, 44)

Since this survey was conducted over nine schools it would be difficult to attribute the negative findings as being simply a localised phenomenon. Other comments made were that some teachers did not know how to conduct searches of the Internet, that there was little work done with the collected information from searches and that students were not given enough time to develop their own ideas and opinions. It would appear that many of the teachers involved in the survey had not had the opportunities to develop the use of ICT in their teaching and learning methodologies.

A wide ranging study concerning the impact of ICT in schools in Australia, USA, England and Hong Kong was made by Eadie (2001). The focus was on changes in the curriculum, the way teachers redesign and present the curriculum, uses made of resources and the way classroom are being reconfigured. The findings of the study are in some ways reinforcing established ideologies and in others enlightening in the sense of what can be achieved.

Once ICT becomes an integral part of student learning, teaching styles and classroom organisation cannot remain unchanged. There will also be a continuing focus on ways ICT can streamline administrative tasks, giving students 24-hour access to learning resources.

It is no surprise to find that the best practice ICT use in schools and institutions with geographic barriers to overcome, appear to be ahead of counterparts in other areas studied in this research.

It has also been noted that where rigorous examination systems and prescribed learning outcomes control the curriculum, it is much harder for innovative use of technology in the curriculum to occur.

(p. 39, 40)

The survey has demonstrated the benefits of using ICT to connect schools over large distances where the exchange of information and examples of good teaching practice can be accomplished. One of the teachers interviewed, said succinctly '*Technology reaches over dangerous stuff like sea and desert*'. That ICT can enable education to take place over large distances can be used positively by large countries to try to overcome any resulting socio-economic divide in the populace. Once international collaborations are established then timescales may become irrelevant with appropriate materials being always available. The suggestion that an education system focussed firmly on examinations makes it difficult for the innovative use of ICT is an indication that to achieve both is not easy.

A reflection of the situation of the use of ICT in schools in Australia was presented by Jones (2003) to the IFIP Working Group Conference held at the University of Melbourne. His comments are very similar to the experiences of professionals in other countries, particularly on the need for specific teacher training to enable teachers to make best use of ICT.

No matter what educational systems mandate and expect, in the end effective learning is very dependent on the competence and will of the teacher. New teachers have not only to acquire proficiency in using technology for educational purposes, they also have to undergo a revolutionary revision of the practices of classroom teaching and learning. Improvement is seen as a consequence of enhancing traditional face to face room-based learning through the use of technology that employs different modes of delivery and can cater for thousands of students in geographically different locations learning at different times.

(p. 1, 2, 3)

The necessity for effective and available in-service training for teachers focussed at the use of ICT in their teaching and learning methodologies is made again in this report. What is surprising is that ICT is seen only as enhancing classroom based learning rather than an opportunity to explore different ways of delivering the educational experience. It is this last point that emphasises one of the directions that may be taken in the future by using the scope of ICT. The potential to reach out beyond the confines of a formal classroom timetable to students in different world wide locations and those in economically and socially deprived areas is undoubtedly one that is in need of being developed.

Not only is ICT being introduced into teaching and learning methodologies but also into the management systems of schools. One survey, conducted in Hungary,

investigating this application was undertaken by Brieter and Stauke (2007) who recognised its value.

The potential of computer based feedback systems to provide assessment data is obvious. The Hungarian case shows how thoughtful implementation procedures can help to slowly adapt it to the requirements of teachers and administrators.

(p. 16)

Many schools already use ICT in educational management systems and realise that the data held by them can be used for more than routine administration purposes. However, the use of this collected data has yet to be implemented consistently to create student profiles and organise individualised study plans.

There was a fascinating application of ICT in Hong Kong during the SARS (Severe Acute Respiratory Syndrome) outbreak in 2003. Schools were closed for the whole of April and students were instructed to stay at home. During this time Hong Kong Baptist University offered schools the use of its Virtual Integrated Teaching and Learning Environment (VITLE) platform, which is internet based. With this system teachers used, by the Internet, virtual classrooms from which to teach their lessons to the students. All this happened with the teachers and students in the safety of their own homes. In their report on the effectiveness of the VITLE platform, Fung and Ledesma (2005) said:

At user level, both teachers and students perceived the platform to be useful and convenient as they could access it from any computer with access to the Internet. Principals thought it had helped break through the limitation of time and space and was effective since lessons could be conducted outside school hours. However, some were unsure whether students were 'attending' the lessons or not.

(p. 52, 53)

Traditionally, education takes place in real classrooms with teachers and students being present in the room at the same time. The experience in Hong Kong was of face to face interaction at the same time but in virtual classrooms with teachers and students attending the classes in cyberspace. There are possible impressive implications for the use of this technology in distance learning.

3.5 Summary

The integration of ICT into the whole school curriculum has a profound effect on all who work in the school and all the students who are in attendance. It will probably lead to teachers revisiting their teaching and learning methodologies to see how best to use ICT in their already established practices and give managers the opportunities to use management information systems to give students personalised programmes of study. The literature reviewed in this chapter shows what advantages there are to be gained for students and teachers when ICT is successfully incorporated into the pedagogy of the school whether it is in China, England or other countries.

The literature also describes the barriers that exist to the successful use of ICT in schools throughout the world. These range from the lack of enthusiasm of teachers and headteachers to those sceptical of the skills of teachers and from inadequate provision of in-service training for teachers to faulty equipment.

The next chapter investigates the methodologies available to carry out this research study and how the eventual choice of paradigm was made. This decision took into account the aims of the study, which was to examine how ICT was used the teaching and learning methodologies of middle schools in two northern cities in China. The

research study was based on the interpretive paradigm with data being collected by means of a triangulation using both quantitative and qualitative methods. The analysis of the collected data had to be robust enough to produce interpretations and conclusions that were valid, reliable and without bias.

Chapter Four

Methodology

4.1 Introduction

The purpose of this research is to examine the use of ICT in the teaching and learning pedagogies of middle schools in two northern Chinese cities. It will ascertain the possibilities for further developments of the use of ICT both in classrooms and in the in-service training for teachers. The ICT practices in schools in England will be examined so as to review the implications and possibilities of their use in middle schools in China.

It was apparent that choices had to be made at several points in order to rationalise the methodological approach, research techniques and the use of appropriate and robust analytical devices. The methodologies employed by the researcher had to encompass the collection of opinions from teachers and students by diverse means, analyse the resulting data, review relevant publications and formulate consistent, unbiased and reliable conclusions regarding the present situation and possible trends.

4.2 Research aims

The aims of the research focus on the use of ICT in middle schools in China. The specific associated aims are:

1. to examine the ways in which ICT is used in middle schools in Chinese cities;
2. to discover the attitudes of teachers and administrators on the most effective use of ICT in the schools;
3. to discover the attitudes of the students on the use of ICT in the classroom and in a broader context;
4. to discover the needs of teachers and students and the resulting implications for the continued and expanded use of ICT in Chinese schools.

A multi strategy approach, as a means of triangulation, using both quantitative and qualitative techniques was employed to address the requirements of aims 1, 2 and 3; these included questionnaires, interviews and lesson observations. Aim 4 was addressed by using the data resulting from the methods previously mentioned along with literature reviews to make a comparative study of the progress made in China with that in other countries; this was to be done with time scales in mind as well as socio-economic considerations. These techniques were not specific to one particular aim but, in themselves, individually addressed many of them.

A questionnaire was devised for distribution to thirty one teachers working at the four schools in the survey. The method of selecting these four schools, in order to avoid bias in the findings of this research, is described in Section 4.8. It was designed to collect personal data, including experience of using ICT in different formats, and ascertain the opinions of teachers on the support they received from their schools in terms of equipment and training and their use of ICT in a social context. The questionnaire that was to be circulated to the students was designed on a similar basis to that for the teachers. It was intended to elicit their views on the effectiveness of the

way ICT was used by their teachers in the classroom, the support they were given at school by way of equipment, its capabilities and availability and their capacity to use ICT in their studies at school and at home and in their social lives.

The data from these two types of questionnaire was such that inferential statistical analyses could be made by using the Statistical Package for the Social Sciences software.

The interviews, which took around thirty minutes each, of the semi-structured type, with three of the headteachers and one administrator, were essential to find their views on the government's initiatives for the integration of ICT into the curriculum and its policies to ensure that these initiatives were not only in place but also being used and that the use was effective in their schools. It was also intended to seek their views on what developments they were looking to introduce in the near future.

The interviews with ten teachers were again of a semi-structured type in order to give them latitude to talk about themselves and the pertinent issues arising from their own individual experiences of introducing and then developing ICT into their teaching methodologies. It was important to elicit their views on the direction and enthusiasm of their managers, including their headteachers, into the integration of ICT in the curriculum of the school and the support, both technical and of the training opportunities that was afforded them. Of great importance was exploring the availability of good quality equipment and software as well as the accessibility they had to computers at school and at home. Each of these interviews usually took between thirty and forty minutes.

The semi-structured interviews undertaken with the students were designed to encourage them to expand on their views as to how effective their teachers were at using ICT in their teaching and learning programmes. It was important to find out how they viewed using ICT themselves for studying in the classroom and at home and what use they made of ICT in their social lives. A total of twelve students were interviewed with each interview taking around fifteen minutes.

As an additional source of information, and where possible from the availability in a time perspective, lessons were observed so as to have a first hand experience of the use of ICT in the classroom. The researcher was able to observe three lessons in full, with each lasting forty five minutes. The researcher took notes throughout each lesson and a digital camera was used to take some pictures as aide memoirs. There was an opportunity to talk to the teacher before and after each of these lessons to discuss the plans for the lesson and what had been achieved.

4.3 Research methodologies

The position of this research in relation to the paradigms of educational research was inherently difficult to finalise. The interpretive paradigm has the concerns of individuals at its heart and deals with the direct experiences of people in specific contexts. The essence of the interpretive paradigm is to understand the world of human experience. The interpretive approach looks at action; it is intentional behaviour and so is forward looking. Research investigates experience and understanding with the aim of finding patterns or theories to explain them. As described by Cohen and Manion in 1994:

The central endeavour in the context of the interpretive paradigm is to understand the subjective world of human experience.

Interpretive researchers begin with the individual and set out to understand the world around them. Theory is emergent and must arise from particular situations; theory must not precede research but follow it.

(p. 36, 37)

With this in mind it is apparent that this study is of the interpretive paradigm and this should be used as a foundation to the study. The aims of the research are not to find grand theories but to investigate possible actions from past experiences.

The basis of the research is the investigation of trends of teaching methodologies, the determination and vision of administrators and managers of schools to incorporate information and communications technology into the curriculum, the enthusiasm, or otherwise, of the teaching profession towards using information and communications technology and the expectations of the learners. Hence, the impossibility of reaching absolute conclusions was accepted which placed the research firmly in the post-positive paradigm. The understanding of the researcher is that the post-positive paradigm is one that acknowledges the imperfections of society and that it is impossible to establish absolutes, but, notwithstanding this, it is still possible to suggest that some claims are more likely to be true than others. However, the opinions of teachers and learners were sought in very localised geographical areas, which lend themselves to the postmodernism paradigm. In educational terms postmodernist research is aimed at developing new knowledge at the same time as disrupting, to a greater or lesser extent, theories that have shaped the practice of education.

Postmodernists argue that there is no one reality and that ethnography captures only the version that the researcher selects.

(Brewer, 2000, p. 44)

Postmodernism is the paradigm that says that local theories are needed or perhaps no theories at all as opposed to general wide ranging ones. This research is seeking to establish the present situation on the use of ICT in education rather than attacking an already established procedure and so it does not come under the aegis of postmodernism. Although the dichotomy of which paradigm would underpin the study was most evident at the outset, as the investigation proceeded the focus centred on that of the initial, post-positive, stance. This stance accepts the imperfections of society but still looks to identify trends and situations which are more likely to be true than others.

4.4 Qualitative or quantitative

The research proposal is multi faceted in that it seeks to find, on the one hand, numerical values for the broad swathe of questions dealing with attitudes to information and communications technology as an asset to teaching and learning and, on the other, opinions from focussed interviews with a sample of administrators, teachers and learners. Walliman's (2001) description of quantitative and qualitative research is quite useful:

Quite a strong distinction is generally made between quantitative and qualitative research. Not only do the appropriate data have different characteristics, but they also require different techniques for their analysis. Natural science has traditionally concentrated on 'hard' quantitative analysis. As it became increasingly obvious that subjective human feelings and emotions were difficult to quantify, qualitative methods were evolved, which took more account of the 'soft', personal data.
(p. 227)

Hammersley (1990) has a view regarding the use of both methods:

All data sources are imperfect, but in different ways, and that means that, through their combination, we may be able to counter the major validity threats.
(p. 99)

This multi strategy approach to research can be valuable as a means of triangulation where results from an investigation employing one strategy can be checked against results using a method associated with another strategy. This is in order to fulfil the scope of the study and maximise its potential and in this study the use of quantitative and qualitative data are complementary.

The specific aims of this research, although focussed on activities within the classroom, are influenced by events in the wider community. Therefore, consideration has been given to whether the research methods should be ethnographic. Pole and Morrison (2003) give a broad definition of ethnography in their book 'Ethnography for Education' as:

An approach to social research based on the first hand experiences of social action within a discrete location, in which the objective is to collect data which will convey the subjective reality of the lived experience of those who inhabit that location.
(p. 16)

This adequately describes this research and confirms its basis as being ethnographic. Certainly it is now acceptable to include quantitative methods as well as qualitative ones in ethnography. The sociological context inherent in part of the questionnaire and again elicited in the interviews would suggest that this should be important in the design of data collection and analysis. With these considerations in mind it was natural to decide to use ethnography to underpin the methodology of the investigation.

The observations of Brewer (2002) in 'Ethnography'

Through the use of data that capture personal experiences the differences between the perspectives of ordinary people and officialdom can be explored. The ethnographer's critical gaze on social life...ensures that academic ethnography is challenging and confrontational.
(p. 168)

fully describe the purpose of this study and why ethnography is vital to it.

4.5 Ethical considerations

The findings of this study are based upon the opinions expressed by professional practitioners in education in China and England and the students who attend school in China. It was, therefore, essential to have full cognisance of the ethical issues that are involved in collecting such data, and the need to follow recommended practices to protect all those involved in providing information, and then in using it. The researcher made herself fully aware of the recommendations published by the British Sociological Association (www.britsoc.org.uk/ethgu2.htm) in its statement of ethics. The topics covered by this statement which were pertinent to this research were professional integrity and relations with, and responsibilities towards, research participants.

Those who volunteered to take part in the collection of data were made aware that they had a right to withdraw from the research process at any time. In particular, in this study, regard was given to protect the identity of those involved and all efforts were made to ensure that their taking part would not adversely affect in any way their

well being. This last point encompassed assuring the participants that their identities would remain anonymous and so they would be safeguarded from any repercussions from any adverse or critical comments they made. Consent was sought from everyone involved especially those responsible for the students. All the protocols in place at the schools taking part in the survey were followed and permissions were sought and obtained from the people indicated by the relevant policies. All the participants were made aware of the purpose of the study and the possible uses to which the findings might be put. They were also assured that none of those taking part would have their identities revealed and neither would the names of the schools involved. It was made clear that the researcher had ownership of the research data but that the final research document with all its findings, interpretations and conclusions would be made available to any of the participants who requested it.

A succinct description of ethics within research is given by Walliman (2001).

There are two perspectives from which you can view the ethical issues in research. One is concerned with the values of honesty and frankness and personal integrity, the other with those of responsibilities to the subjects of research, such as privacy, confidentiality and courtesy.
(p. 213)

The researcher has made every effort to uphold these views throughout this research.

4.6 Bias

The elimination of bias in the collection and subsequent analysis of the data was an important consideration. A recognition of the ways in which bias could be present

went a long way towards determining that the study was not affected. In general terms the position was clearly described by Fetterman (1998) in 'Ethnography',

The point, simply, is that ethnographers must attempt to view another culture without making value judgements about unfamiliar practices, but they cannot be completely neutral....The ethnographer can guard against the more obvious biases, however, by making them explicit and by trying to view another culture's practices impartially.
(p, 23)

The working practices and the interrelationships between teacher and student in the classroom in China are likely to be very different to those experienced by observers from the western world in their own countries. It would be easy to misinterpret these and presume that new technologies, for instance, would not be welcomed. Since the researcher, being herself Chinese, is well versed in the culture of China and in particular its educational practices, the focus of this research study, and her living in England for several years has given her an insight into the culture of that country as well, she has been in an ideal position to be aware of potential bias in this study and make every attempt to avoid it.

4.7 Reliability and validity

The basis on which to establish the reliability and validity of a research project are described by Freebody (2003)

The fundamental ways to enhance reliability and validity are through ensuring the clarity and accuracy of the representations of: the context of the research; the statement of the problem to be investigated; the

ways in which the researcher gained access to the data; the assumptions of the participants; and understandings on the site about the researcher's role as a researcher.
(p. 77)

The validity of this study was established by continuously reflecting on its stated aims and ensuring that the techniques for collecting the data and the resulting statistical methods employed in its analysis were commensurate with them. The researcher established that the chapters detailing the findings and conclusions were commensurate with the aims and objectives of the study as outlined in the first chapter.

The reliability of this research was addressed by carefully planning the wording of the questions in the questionnaires so as to eliminate any ambiguities in interpreting their meanings and conducting a trial by means of piloting them with a small sample (see Section 4.13). The researcher was careful in trying to establish a neutral atmosphere during the interviews while, at the same time, creating a comfortable ambience which encouraged the interviewees to give frank and honest opinions. Multiple methods were employed to collect data relevant to the study and the analyses of the quantitative data used to corroborate the findings from the qualitative investigation. These methods for establishing the validity and reliability of the research have given rigour to the study.

4.8 Survey and sampling

The research questions are concerned with the attitudes of teachers and students to the use of ICT in the teaching and learning environment and their views on the impact it

has had. At the outset it was realised that it was important to collect data from a large number of cases, in order to eliminate bias and for the resulting analysis to be valid. Therefore it was appropriate to use a survey method to collect systematic and comparable data from quite a large number of people by means of questionnaires, interviews and some observations. Consideration had to be given as to how to ensure that the sample of teachers and students, to whom the questionnaires were to be given, was as representative as possible of the large number throughout the country. It was also important to bear in mind the disparity of educational provision between the rural and urban areas in China; to try to compare these two by undertaking one survey was deemed to be impossible. Therefore the focus of this research would be educational institutions and authorities in large conurbations. Since the research is about education in China and the researcher is domiciled in England then, through purely practical and financial reasons, it was based in two cities in one region of the country. The researcher once taught in the city of Shenyang in the north east of China and it was therefore eminently sensible to use this city, as well as Beijing, for this research project.

Both of these cities have well over a hundred junior and senior middle schools which are ranked by a well established system. In order that the views obtained would be those from a full cross section of middle school education it was decided to ask one school from each of the four quartiles of the ranking system to take part in this survey. Avoiding bias in the selection of the schools was very important and so, to this end, all the middle schools in Shenyang and Beijing were placed into their particular quartiles. To ensure that schools were chosen at random, every school in each quartile was assigned a unique number. The random number function on a calculator was used

to generate a random number and then the school with this number was approached to take part. However, although the theory worked effectively to this point, the school selected by this method sometimes declined the offer to take part which meant that the process had to be repeated several times until success was achieved. Of the four schools eventually chosen one was in Beijing and the rest in Shenyang and, vitally, each one was in a different quartile.

The process of gaining permission to involve particular classes of students proved to be a lengthy one; agreement had to be sought from the headteacher, the administrator and the class tutor. The schools involved assured the researcher that the parents of the pupils would have no objection to their children answering the questionnaires and the researcher was assured that the policies of the school pertaining to this had been followed. The schools agreed to take the responsibility of obtaining the appropriate permission from the parents; it was stressed from the outset that the responses from the students would be anonymous and that the names of those taking part would not be revealed. It was also found to be persuasive in gaining this cooperation that the names of the schools taking part would be kept confidential in the final report. The classes were chosen so that a full range of ages and gender of students in Chinese middle schools were represented in the data collection. The headteachers of the schools arranged for staff at the schools to give the questionnaires to the pupils, and to collect them in lessons on completion; this had the added advantage that the vast majority were returned.

Time constraints meant that the questionnaires had to be administered by the staff of the schools taking part; these being collected by the researcher on her later visits to conduct interviews and observe lessons.

4.9 Quantitative research design

The aim of the quantitative section of the research was to collect data that was not affected by the opinions and interpretation of the researcher and that was numerate for analytical purposes. Therefore, the instrument used for the collection of quantitative data was a questionnaire; one for the teachers and a different one for the students. Although the two questionnaires were different, some of the questions on both of them were essentially the same. The purpose of this duality was to examine some of the variables under investigation from the different standpoints of teacher and student and ascertain the different stances each of these groups were taking. All the questions posed in the questionnaires were closed and their responses were all of the multiple choice type.

The questionnaires were used for collecting data about both the teachers and students and their experiences of the use of ICT in the classroom. Personal details of age, gender and experience of using computers of all participants were recorded. A limited amount of socio-economic data, pertinent to the experiences of using ICT in general and computers in particular by the two groups, was considered to be useful and questions were posed with this outcome in mind.

4.10 Data collection by questionnaire

It was relatively easy for the researcher to establish that that the questionnaire should be of the self-completion type. It is a quick way to collect data, there is no variability in the questions asked of the respondents and there is no bias introduced from the presence of the interviewer. The study is not aimed at teachers of specific subjects, age groups, gender, and length of teaching experience and therefore the researcher decided that the sampling of the teachers who would take part in the survey would be done on a non-probability basis. A similar situation existed for the students and here again it was decided to perform the sampling of them on a non-probability basis. The questionnaire for the teachers can be seen in Appendix 1 and that for the students is in Appendix 2. The researcher had many discussions with the headteachers of the schools, sometimes face to face and at other times by means of long distance telephone calls, in order to organise an effective method of selecting appropriate classes to distribute the questionnaires to and the best way to collect them on completion so that the majority of them were returned for future analysis. These discussions also had to come to a decision on how best to organise a sample of teachers to respond to the teachers' questionnaires.

4.11 Data collection by interview

There were several methods used in the interview processes. This was not because of some esoteric standpoint of certain ones being best used in particular circumstances but for the much more mundane reason of convenience. Convenience of the very short time available to the researcher on her visits to China and of the time the interviewees, being teachers and students, had during the school day in typically very busy Chinese

schools. It had been decided by all concerned that the best place to conduct the interviews would be at the schools where both students and staff would feel most comfortable and relaxed.

It had been the intention to record the interviews and transcribe them later; however, this was not viewed positively by the prospective interviewees. There was an underlying apprehension that if, by some mischance, a recording that contained critical comments came to be in someone else's hands, rather than the interviewer, then that could create difficulties. With this situation in mind the interviewer established the confidence of those who were going to be interviewed by agreeing to take notes during their discussions and keeping their identities confidential at all times, reassuring them that the information they gave would be safeguarded. They were also made aware of the purpose of the research and what part the interviews played in it. The interviewees found these reassurances comforting and they were then more than ready to make their contributions.

The most convenient places in which the interviews could take place were the staff resting room for the teachers and an empty classroom for the students. All involved were satisfied with these locations. Owing to the constraints of the school timetable for the teachers and students and the relatively short period of time for which the researcher was available a programme of interviews was scheduled in which one was conducted in a group situation and the others individually. All those who were scheduled to be interviewed as part of a group were made aware of the other participants in the group and were comfortable with the arrangements.

It was the intention to cover the same ground at each interview and group meeting. However, it was decided that tightly structured interviews would not be appropriate. This was because the interviewees, particularly the teachers, were not used to being asked to give their own opinions and perhaps be critical of decisions of those who made them. Therefore time was needed at each interview to break down any reservations the interviewees had so that they would be more forthcoming and feel able to give their true opinions. The time involved in this process would vary from person to person and so a structured interview would not lend itself to breaking down any existing barriers. Freebody (2003) describes semi-structured interviews:

Aim to have something of the best of both worlds by establishing a core of issues to be covered, but at the same time leaving the sequence and the relevances of the interviewee free to vary, around and out from that core.
(p. 133)

A semi-structured interview technique was employed where the intention was to cover a few topic areas in depth and allow the interview to develop rather than have to move strictly from question to question. The format of the interviews with the teachers can be seen in Appendix 5 and that for the students in Appendix 6. The group interview followed the same pattern.

Inevitably, since this was taking place in a working environment, some of the interviews with teachers had to be cancelled because of other priorities in the school. When these could not be rescheduled to take place in the school in the time available it was necessary to conduct the interview by telephone when the teacher had gone home after work. Ten teachers were interviewed with each interview lasting thirty to

forty minutes; however, the ones conducted by telephone lasted up to an hour. Twelve students were interviewed and these lasted from fifteen to twenty minutes. There was one group interview with two teachers and four students which lasted twenty five minutes.

4.12 Data collection by observation

While visiting the schools there was occasionally time available for the researcher to observe lessons taking place. Of particular interest were those where ICT was being used. Again permission had to be gained beforehand from the headteacher, administrator and the teacher whose lesson was to be observed. The teachers involved always seemed willing to have their lessons observed and were proud that they had been chosen. Three full lessons were observed, each one lasting for forty five minutes; the details of one of which can be seen in Appendix 7.

4.13 Pilot studies

It was recognised that undertaking a pilot study for both the questionnaires and the interview process was very desirable. At the same time it was also realised that to make a separate journey half way round the world for this purpose was totally impracticable. Fortunately, two local schools with established connections with the researcher's university were more than willing to help with the pilot studies.

The draft questionnaires were answered by a few students at these two schools and this resulted in a slight restructuring to remove any element of doubt in the phrasing of the questions.

The practice interviews with teachers in England were very valuable in gauging the number and type of areas the interviewer could realistically cover in the time that was available in China for this section of the research. Another advantage was that the teachers who were interviewed gave their consent for their interview notes to be used in the research; which has enabled some comparisons to be made between the views of teachers in China and England. This facet was not envisaged at the start of the research and has the potential of being a valuable benchmark.

4.14 Analysis of questionnaires

The temptation to restrict the analysis of the questionnaire data to simple processes in statistical terms had to be avoided. A 'Microsoft excel' spreadsheet was used to record all the responses from the questionnaires that had been returned. Rather than attempting to analyse this data with the basic statistical functions available with the spreadsheet a more substantial statistical package was needed. In the area of predictive analytics the package used by the researcher's university is the Statistical Package for the Social Sciences (SPSS). It was natural therefore to use SPSS to analyse the data stored in the spreadsheet. Although there are many more sophisticated techniques available with SPSS than it was anticipated would be needed it could not be predicted at the outset which ones would be most useful in the analysis. Another, more mundane, factor in the decision to use SPSS for the analysis was that there was a wealth of expertise from whom help could be found if difficulties did arise.

4.15 Analysis of interviews and observations

The process of conducting several individual and group meetings along with notes from lesson observations resulted in a mountain of words from which meaningful conclusions had to be made. Simply to pour back and forth through all the notes and make more notes in the hope that realisations would become apparent was not an approach that gave confidence. The grounded theory method, first devised by Glaser and Strauss in 1967 and later developed further by Glaser, is known as a powerful way to collect and analyse qualitative data and draw meaningful conclusions. The method uses a coding process throughout the notes that had been taken and this coding is then analysed. A description of grounded theory is given by Strauss and Corbin (1998).

Grounded theory is a general methodology for developing theory that is grounded in data systematically gathered and analysed. Theory evolves during actual research and it does this through continuous interplay between analysis and data collection.
(p. 158)

In general terms grounded theory is done by the general method of constant comparative analysis and categories emerge that constitute explanatory propositions to account for the patterns which, in turn, lead to the developments of theoretical statements; which is not the basis of this research. However, one of the themes that had been encountered in investigating the use of grounded theory did seem to be a promising one to pursue. This was identifying the key points in the interview data and analysing these for trends and contradictions.

Therefore the analysis concentrated on looking for key points and themes in the predetermined areas that the interviews focussed upon. In so doing, the interviews with teachers and students were initially analysed separately. The conclusions drawn from these analyses were then combined in order that the perceptions of one group could be compared and contrasted with those of the other.

4.16 Summary

The findings of a research project on modern educational thought can only be meaningful if the study is based on well established procedures. This chapter has firmly placed the study in the post-positive paradigm in which there is an acceptance of society's faults but still looks to find situations that are likely to be true and the research was carried out on that basis.

Multiple methods were employed to collect all the relevant data and these ensured the overall rigour of the study. These methods produced quantitative and qualitative data from the use of questionnaires, semi-structured interviews and published literature. Procedures were implemented so as to take into account ethical issues and to reduce the possibility of bias. It was established that the quantitative data that was collected would be analysed by SPSS and thematic analysis methods would be used to analyse the qualitative data.

The next chapter examines the quantitative data. This data was collected by means of a questionnaire distributed to a sample of teachers and a different questionnaire given to a sample of students. These questionnaires were designed to collect information

about their opinions on the use of ICT in teaching and learning and the use of ICT in more of a social context away from the school environment.

Chapter Five

Quantitative Analysis

5.1 Introduction

This chapter details the statistical analysis of the quantitative data. This data was collected from the responses to two different questionnaires. One questionnaire was distributed to the teachers at the four schools in China that took part in the survey and the other one was distributed to pupils at the same schools.

A total of 31 teachers returned their completed questionnaires and 237 of the students returned their questionnaire. The two questionnaires were different and so were analysed separately. In both cases the responses were entered onto spreadsheets, the layouts of which were designed so that the responses could be entered question by question for one respondent before moving onto the next one. The use of spreadsheets enabled the completed data to be relatively easily checked for accuracy and so ensure the resulting reliability of the analysis. Once checked, the data was transferred from the spreadsheets onto the Statistical Package for the Social Sciences (SPSS) software.

The facilities provided by SPSS were used to analyse the responses question by question and then a series of crosstabulations were performed with the majority of the

variables so as to conduct a more detailed investigation. Again the responses from the teachers and students were treated entirely separately.

5.2 Profile of the schools

School A

- Large school
- 3000 students
- 193 teachers; 156 female teachers and 37 male teachers
- 2 electricians
- 5 computer teachers

School B

- Medium-sized school
- 1340 students
- 160 teachers; 130 female teachers and 30 male teachers
- 2 electricians
- 3 computer teachers

School C

- Medium-sized school
- 1300 students
- 130 teachers; 100 female teachers and 30 male teachers
- 2 computer teachers

School D

- Medium-sized school
- 1018 students
- 91 teachers; 75 female teachers and 16 male teachers
- 1 computer teacher

5.3 Quantitative analysis for the teachers

5.3.1 Statistical analysis of the questions on the teachers' questionnaire

The teachers' questionnaire consisted of twenty two items (see Appendix1). The analysis starts with observation from the responses to the individual questions.

Table 5.1 Question 1

Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	6	19.4	19.4	19.4
Female	25	80.6	80.6	100.0
Total	31	100.0	100.0	

The majority of the teachers, just over 80%, who responded to the questionnaire in China, were female. This broadly reflects the distribution of genders in the sample of schools involved in the survey. The middle schools in the cities in China have a majority of female teachers but this situation cannot be extended to all schools throughout China, especially those in the rural areas.

Table 5.2 Question 2

Age

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid under 30	14	45.2	45.2	45.2
30 - under 40	12	38.7	38.7	83.9
40 - under 50	3	9.7	9.7	93.5
over 50	2	6.5	6.5	100.0
Total	31	100.0	100.0	

It has been the tradition that teachers in China retire at a comparatively early age compared with those in the UK. This goes some way to explaining that only 16% of respondents were over 40 years old. It is also the researcher's experience that the well established mature teacher is less willing to become involved in surveys and prefers to carry on with their work without unwanted distractions. However the healthy spread of ages of the teachers in the under 40 years old age groups enables the analysis to be generalised with some confidence.

Table 5.3 Question 3

What subject do you teach?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Chinese	7	22.6	22.6	22.6
Mathematics	2	6.5	6.5	29.0
Others	22	71.0	71.0	100.0
Total	31	100.0	100.0	

Almost 30% of lessons in middle schools in China are in Chinese and mathematics because these subjects are the most important elements of the entrance examinations children take when transferring to senior high school and later to university. The distribution of teachers as shown above (see Table 5.3) is representative of this subject base for middle school teachers.

Table 5.4 Question 4

How many years have you been teaching?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 5	9	29.0	29.0	29.0
	5 - 10	11	35.5	35.5	64.5
	11 - 15	6	19.4	19.4	83.9
	More than 15	5	16.1	16.1	100.0
	Total	31	100.0	100.0	

The teaching profession in China is one that is considered to be a vocation for life. That is, students take up the profession on graduating from university and, barring unforeseen events, stay in it until retirement. In recent years, because of an influx of new teachers, schools have been encouraging the more experienced members of staff to take early retirement. This policy has had the backing of local government by the offer of persuasive financial incentives. It is usual therefore for the majority of teachers in any school to have been in post for less than ten years or so. This trend is reflected in the experience shown by the teachers in this sample survey where 84% of the teachers have been teaching for less than 16 years and 65% for 10 years or under (see Table 5.4). The staff with a teaching experience of over 15 years account for just 16% of the teachers surveyed. This is likely to be representative of not only the complete staff of the schools taking part in the survey but of the staffing dynamics of middle schools generally in the urban areas.

Table 5.5 Question 5

Do you use a computer in your teaching?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Regularly	27	87.1	87.1	87.1
	Sometimes	4	12.9	12.9	100.0
	Total	31	100.0	100.0	

In view of the fact that computers in the classroom is a relatively new phenomenon in China it is quite surprising that well over 80% of teachers regularly use ICT in their lessons (see Table 5.5). The response is overwhelmingly positive. It would seem to reinforce the premise that teachers like the idea of using modern technology to improve their teaching rather than relying on the traditional chalk and talk methods. Certainly it would appear from the data that teachers in large cities are very much in favour of using ICT. This would indicate that the government's policies for introducing ICT into schools were meeting with some success.

Table 5.6 Question 6

How many years have you been using a computer?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Less than 1	5	16.1	16.1	16.1
1 - 4	12	38.7	38.7	54.8
5 - 7	8	25.8	25.8	80.6
More than 7	6	19.4	19.4	100.0
Total	31	100.0	100.0	

It is important to emphasise that the introduction of ICT into middle schools in China only began to become a priority in 1997. It is very encouraging that, with this background, over 45% of the teachers surveyed have been using ICT for more than four years (see Table 5.6).

Table 5.7 Question 7

Does ICT help your teaching?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	31	100.0	100.0	100.0

The questionnaires were completed and returned by the teachers in conditions of complete anonymity. Therefore, in responding to the questions, there is no need to suppose that there was a desire to be seen to be following the Government's line. The result of this question (see Table 5.7) shows that there is an almost total belief, across all genders and age groups and from those teachers with less than a year of experience using a computer to those who can be classed as experts, that ICT helps all teachers in their work. However, the interviews show a somewhat different picture with some teachers having reservations about whether it helps or not. It is likely that the respondents to the question were really saying *'Yes, in principle'*. The teachers who responded to the survey are not necessarily the same as those who were interviewed.

Table 5.8 Question 8

How many students share a computer in classes in your school?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	One each	25	80.6	80.6	80.6
	Several	3	9.7	9.7	90.3
	Don't know	3	9.7	9.7	100.0
	Total	31	100.0	100.0	

There appears to be a very reasonable provision of computers across the schools in the survey which is a very pleasant surprise given the relative short time the initiative, to introduce ICT into schools, has been in place. Even though there could be a slight element of guesswork in some of the responses to suggest that students can work with a computer by themselves rather than having to share with a fellow student in 89% of their classes is an excellent situation to have (see Table 5.8). It demonstrates the commitment of the Government has towards introducing ICT into the schools' curriculum and that it is willing to support it with the necessary finance.

Table 5.9 Question 9

Do you understand what ICT means?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	17	54.8	54.8	54.8
No	11	35.5	35.5	90.3
No response	3	9.7	9.7	100.0
Total	31	100.0	100.0	

Almost half of the respondents admitted to not knowing what ICT means (see Table 5.9). It is also likely that some of those who said that they did were not quite sure and others thought that they ought to say they did irrespective of their true thoughts. This suggests that well over half the staff in the survey do not know what ICT is. This statistic was further investigated through the interview process. It is to the credit of all the teachers that, even though they are not certain what the overall implications of ICT are, they are so positive about its use to them individually in their teaching methodologies as was shown by the responses to Question 7 (see Table 5.7).

Table 5.10 Question 10

Where can you use the Internet out of school?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid At home	12	38.7	38.7	38.7
Friend's house	13	41.9	41.9	80.6
Internet cafe	2	6.5	6.5	87.1
I don't	1	3.2	3.2	90.3
No response	3	9.7	9.7	100.0
Total	31	100.0	100.0	

Table 5.10 shows that, when teachers are not at school, it is encouraging that over 80% of them have access to the Internet without having to go into an Internet café. However, nearly 50% of these teachers have to go to a friend's house which cannot be very convenient. Much of the teacher's lesson preparation and planning will be

undertaken when at home; to be able to access the Internet for ideas and information in this environment is important.

Table 5.11 Question 11

Has your school a campus network?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	77.4	77.4	77.4
	No	7	22.6	22.6	100.0
	Total	31	100.0	100.0	

What was determined when the teachers were being interviewed later in this research was that three out of the four schools had a campus network. This is accurately reflected in these results from the questionnaires (see Table 5.11). Although the definitive answer to the question was easy to determine its position as part of the questionnaire was twofold. One was to find out the awareness of teachers in very large schools about what was happening in the school outside the confines of their departments. The other was to try to ascertain how effective the induction programme was for new members of staff. The size of the schools is the important factor here. On both these measures all the schools were seen to be performing well.

Table 5.12 Question 12

Do teachers like to use computers in their lessons?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	31	100.0	100.0	100.0

This result from the staff surveyed by the questionnaire is a resounding approval for the use of ICT in their lessons (see Table 5.12) and could be extrapolated to across the whole curriculum. However, it must be borne in mind that the government requires teachers to introduce ICT into their pedagogies. Again the teachers responded

anonymously and therefore there is no reason to suppose there is any form of bias in the answers. However, this result must be treated with some caution as some of the teachers who were interviewed later in the research certainly did not like to use ICT in their lessons. Nonetheless the analysis can be said to show that the great majority of teachers welcome ICT into their classrooms.

Table 5.13 Question 13

Can you access the Internet on the computers in your school?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	23	74.2	74.2	74.2
Some of them	8	25.8	25.8	100.0
Total	31	100.0	100.0	

While the provision of computers in middle schools has been shown to be very good being able to access the Internet on them is much more variable. Documents seen on Chinese websites suggest that the provision of Internet access would seem to depend upon the finance available at the different schools. One of the four schools in the survey has extremely limited access to the Internet which is shown very clearly from Table 5.13 in that 25% of the teachers cannot use the Internet at school. The ones with available financial resources appear to be determined to have everything they can by way of the latest technology and Internet access is a high priority. What the responses to this question show is that this provisions is patchy across the schools in the cities.

Table 5.14 Question 14

How do you solve computer problems?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Ask a computer teacher	11	35.5	35.5	35.5
Ask a colleague	14	45.2	45.2	80.6
By myself	4	12.9	12.9	93.5
Other	2	6.5	6.5	100.0
Total	31	100.0	100.0	

One category of ‘who to ask’ which was not referred to in this question is the computer technician. Very simply, that is because the schools taking part in the survey, as yet, do not have them. This situation is the same with the vast majority of urban middle schools in China. Refreshingly though, the responses suggest that, rather than keeping the problems to themselves and possibly not being able to find a solution at all and being put off using ICT altogether, the teachers have enough confidence to ask other teachers for help. Over 80% say that is what they do when they encounter a problem (see Table 5.14). This openness with colleagues and support for each other is surely a very positive outcome and one which should lead to a fully computer literate teaching staff. It would, of course, be immeasurably helped by having an expert technician on hand all the time.

Table 5.15 Question 15

Do you send emails to your students?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes, often	8	25.8	25.8	25.8
No	13	41.9	41.9	67.7
Yes, sometimes	10	32.3	32.3	100.0
Total	31	100.0	100.0	

More than half the teachers communicating with their students by email is a most surprising and, at the same time welcome, result (see Table 5.15). To have such a

large number of teachers using computers and the Internet in this way and so early in the whole-school development of ICT is a finding worthy of note. Although it is possible that this percentage would be less if many more teachers had taken part in the survey it still shows that this method of communicating with students is one that is sure to grow, and probably very quickly.

Table 5.16 Question 16

Do you send emails to your colleagues?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	48.4	48.4	48.4
	No	16	51.6	51.6	100.0
Total		31	100.0	100.0	

In table 5.16 it is surprising that slightly fewer teachers communicate by email with their colleagues than with their students. By now, in offices round the world that have embedded ICT, staff routinely communicate with each other by email. Sometimes, it is said, even when they work at desks next to each other. The reason might be that teachers work in very close teaching groups and so their communication is just within the group and so it is easy to talk face to face at many times in the working day. What again is certain is that emails will be an increasingly predominant way of staff communicating with each other in the near future. Those teachers with managerial responsibilities will soon realise the effectiveness of using communication by email.

Table 5.17 Question 17

Do you send emails to parents?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	4	12.9	12.9	12.9
No	26	83.9	83.9	96.8
No response	1	3.2	3.2	100.0
Total	31	100.0	100.0	

At this stage in the development of ICT in the educational curriculum and management of middle schools, the suggestion that over 12% of teachers are in the practice of using emails to communicate with parents is a success (see Table 5.17). The culture in China is that parents and teachers are in regular communication, with parents often just calling in at the school unannounced to talk with their child's tutor; this is very much encouraged. The parents still support the teachers in the actions they take and sanctions they give. The one child for one family policy has made the only child more precious to the parents and consequently many maybe rather spoiled. The consequence of this is that a small number, at this stage, of parents are prepared to challenge what they perceive as unfair sanctions on their child.

Table 5.18 Question 18

Does your school give ICT training for the teachers?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	29	93.5	93.5	93.5
No	2	6.5	6.5	100.0
Total	31	100.0	100.0	

Since the teachers in this survey were drawn from four schools and their numbers reasonably equally divided among them, table 5.18 shows that it would appear that communication is somewhat lacking for the two teachers who responded negatively to this question. This does highlight the problem of effective communication for staff in

very large schools. The fact that ICT training is shown to be available in all the schools surveyed is encouraging and those who do not avail themselves of this training do assimilate general instructions and develop their own skills.

Table 5.19 Question 19

What kind of computer do you own?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Laptop	3	9.7	9.7	9.7
	PC; no laptop	23	74.2	74.2	83.9
	Don't have one	5	16.1	16.1	100.0
	Total	31	100.0	100.0	

Although only 16% of the teachers in the survey do not own a computer (see Table 5.19) it is still a significant number. This is particularly so when Government initiatives are driving ICT into the teaching and learning methodologies of all Chinese schools. It places the teachers without a computer at a distinct disadvantage. They can only use the ones at the school which can have a disruptive effect on their lives and will not encourage them to take up the challenges and realise the advantages of this new technology. This 16% is a disappointingly large number when seen in the context of all the middle schools in urban China.

Table 5.20 Question 20

Do you use an Interactive Whiteboard in your lessons?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	22.6	22.6	22.6
	No	20	64.5	64.5	87.1
	No response	4	12.9	12.9	100.0
	Total	31	100.0	100.0	

The use of interactive whiteboards has become more prevalent as part of the ICT provision in schools in England; their use spans all curriculum areas and they are viewed positively by most of the staff who use them. It is only in the past four or five years that interactive whiteboards have been introduced into Chinese schools and it must be seen as a success that over 20% of teachers already use them in their lessons (see Table 5.20). Once teachers realise what possibilities interactive whiteboards open up in the educational environment then the percentage using them should increase enormously. To make the most of this technology it is important that all teachers either have their own laptop or have access to one.

Table 5.21 Question 21

Can you use the school's computer suite at any time you want?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	64.5	64.5	64.5
	No	11	35.5	35.5	100.0
	Total	31	100.0	100.0	

The experience in England is that the demands on schools' computer suites are regularly greater than can be accommodated. It would seem from this survey that the situation is the same in China. The finding, that over 64% of computer suites are always available, is impressive (see Table 5.21). It should give teachers the encouragement to prepare lessons that incorporate the use ICT without the worry of whether there will be somewhere to teach them.

Table 5.22 Question 22

Is there a computer in every classroom in your school?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	31	100.0	100.0	100.0

This is an advantageous situation to have if ICT is to be successfully integrated into the teaching and learning curriculum. The fact that the question (see Table 5.22) is answered positively means that every teaching group can have the use of a computer in its lessons when it is required. However, it is certain, from the interviews that have taken place, that it is not possible to access the Internet on all these computers. This is where provision of effective ICT is lacking at present; no doubt plans are in place to rectify this problem in the near future.

5.3.2 Comparative analysis of the responses given by the teachers

Having analysed the responses to the individual questions on the teachers' questionnaire a more detailed investigation had to be undertaken which considered the interrelationships between the responses to the questions. In particular a close analysis of the effect of gender and age on the responses to the questions was deemed appropriate. A series of comparative relationships was calculated and the results analysed. These analyses were carried out by using the SPSS software. Many of these cross tabulations had outcomes which were considered to have little consequence and have therefore not been recorded. All the ones from which an analysis was meaningful are being reported in detail. However, the qui-square tests were inconclusive and these have not been included.

Table 5.23

Gender * Age Crosstabulation

Count		Age				Total
		under 30	30 - under 40	40 - under 50	over 50	
Gender	Male	3	1	1	1	6
	Female	11	11	2	1	25
Total		14	12	3	2	31

Table 5.23 analyses more closely the personal details of the teachers taking part in the survey. It can be seen that, given the conditions stated earlier regarding the overall staffing distributions of the four schools, there is a pleasing distribution of female and male teachers in all the age distributions. This gives confidence that the respondents to the teachers' questionnaire fully represented the cross section of all the teachers in gender and age.

Table 5.24

Gender * How many years have you been teaching? * Age Crosstabulation

Count			How many years have you been teaching?				Total
Age			Under 5	5 - 10	11 - 15	More than 15	
under 30	Gender	Male	3	0			3
		Female	5	6			11
		Total	8	6			14
30 - under 40	Gender	Male	0	1	0	0	1
		Female	1	3	5	2	11
		Total	1	4	5	2	12
40 - under 50	Gender	Male			1	0	1
		Female			0	2	2
		Total			1	2	3
over 50	Gender	Male		0		1	1
		Female		1		0	1
		Total		1		1	2

It has been seen earlier (Table 5.4) that the distribution of the professional experience of teachers in the sample is representative of teachers generally in urban middle schools in China. The above crosstabulation (see Table 5.24) shows that there is a good range of experience across all the age groups and genders in the sample. It is interesting to see that one of the female teachers in the over 50 years old age group entered teaching late and has been teaching for between 5 and 10 years; this is unusual in China.

Table 5.25**Gender * Do you use a computer in your teaching? * Age Crosstabulation**

Count

Age			Do you use a computer in your teaching?		Total
			Regularly	Sometimes	
under 30	Gender	Male	3	0	3
		Female	10	1	11
	Total		13	1	14
30 - under 40	Gender	Male	0	1	1
		Female	10	1	11
	Total		10	2	12
40 - under 50	Gender	Male	1	0	1
		Female	1	1	2
	Total		2	1	3
over 50	Gender	Male	1		1
		Female	1		1
	Total		2		2

The purpose of this analysis (see Table 5.25) was to investigate the trends, if any, between the use by teachers of ICT in the classroom and their gender and ages. Those who do not use a computer regularly in the classroom are distributed quite evenly across the gender and age groupings. Therefore it can be deduced that the gender and age of teachers are not factors which determine the likelihood of their using a computer in their teaching. The perception sometimes made in the UK is that maybe older teachers are more reluctant to adopt new technology into their teaching methodologies cannot be made of teachers in middle schools in China. In sociological terms it may be that teachers in China are likely to follow the government's directions. In financial terms it is also true that there are rewards, in terms of bonuses, paid to those who do so successfully in China.

Table 5.26**Gender * How many years have you been using a computer? * Age Crosstabulation**

Count

Age			How many years have you been using a computer?				Total
			Less than 1	1 - 4	5 - 7	More than 7	
under 30	Gender	Male	2	0	0	1	3
		Female	2	6	1	2	11
	Total		4	6	1	3	14
30 - under 40	Gender	Male	0	0	0	1	1
		Female	1	5	5	0	11
	Total		1	5	5	1	12
40 - under 50	Gender	Male		1	0	0	1
		Female		0	1	1	2
	Total			1	1	1	3
over 50	Gender	Male			0	1	1
		Female			1	0	1
	Total			1	1	2	

There is a large spread in experience that teachers have in computer use for all the four age groupings (see Table 5.26); this is particularly apparent for the female teachers. The proportion of the number of years teachers have been using computers increases with age; with 29% of the under 30 years old age group having used them for more than 4 years compared with 80% for the over 40 years old teachers. The teachers in the over 40 years old age groups have all been using a computer for more than a year. With this experience these established teachers are in a good position to incorporate ICT into their teaching methodologies.

Table 5.27

How many years have you been using a computer? * Do you use a computer in your teaching? * Age Crosstabulation

Count			Do you use a computer in your teaching?		Total
Age			Regularly	Sometimes	
under 30	How many years have you been using a computer?	Less than 1	4	0	4
		1 - 4	5	1	6
		5 - 7	1	0	1
		More than 7	3	0	3
	Total		13	1	14
30 - under 40	How many years have you been using a computer?	Less than 1	1	0	1
		1 - 4	5	0	5
		5 - 7	4	1	5
		More than 7	0	1	1
	Total		10	2	12
40 - under 50	How many years have you been using a computer?	1 - 4	1	0	1
		5 - 7	1	0	1
		More than 7	0	1	1
	Total		2	1	3
over 50	How many years have you been using a computer?	5 - 7	1		1
		More than 7	1		1
	Total		2		2

It could be surmised that a teacher's experience of using a computer would automatically be translated into using this technology in teaching practices. It is worth noting here (see Table 5.27) that 13% of the teachers on the survey have experience of using computers, in most cases this is quite substantial use as well, and yet do not regularly use ICT in the classroom. It may be the case that the standard of equipment provided by the school is less than encouraging, but, since the questionnaire was completed anonymously, with the teachers not indicating which school they were employed at, to encourage truthful responses, this hypothesis cannot be substantiated.

Table 5.28**Gender * Where can you use the Internet out of school? * Age Crosstabulation**

Count

Age			Where can you use the Internet out of school?					Total
			At home	Friend's house	Internet cafe	I don't	No response	
under 30	Gender	Male	1	2	0	0	0	3
		Female	2	6	1	1	1	11
		Total	3	8	1	1	1	14
30 - under 40	Gender	Male	0	1	0		0	1
		Female	6	2	1		2	11
		Total	6	3	1		2	12
40 - under 50	Gender	Male	0	1				1
		Female	1	1				2
		Total	1	2				3
over 50	Gender	Male	1					1
		Female	1					1
		Total	2					2

The proportion of female teachers being able to use the Internet at home is 40% while that of the male teachers is 33% (see Table 5.28). This is not a great difference, but the proportion of male teachers being able to use the Internet at a friend's house, 67%, is almost twice that of the female teachers at 36%. The age of the teachers most likely to use a friend's house is under 30 years old; the youngest age grouping. It is likely that friendships formed at school and university are still strong at this age and growing families do not inhibit this type of social occasion.

Table 5.29**Gender * How do you solve computer problems? * Age Crosstabulation**

Count

Age			How do you solve computer problems?				Total
			Ask a computer teacher	Ask a colleague	By myself	Other	
under 30	Gender	Male	2	1	0		3
		Female	3	6	2		11
	Total		5	7	2		14
30 - under 40	Gender	Male	0	0		1	1
		Female	4	6		1	11
	Total		4	6		2	12
40 - under 50	Gender	Male	0	0	1		1
		Female	1	1	0		2
	Total		1	1	1		3
over 50	Gender	Male	1		0		1
		Female	0		1		1
	Total		1		1		2

The detailed analysis of the methods teachers use to solve the computer problems they encounter in their work (see Table 5.29) shows that 75% of those who rely solely upon themselves are female and are from the opposite ends of the age groupings. There is a gender difference in teachers who are ready to ask a colleague for help in that 67% of male teachers do while the proportion for female teachers is 84%. What is surprising is that, of those teachers who ask for help from a fellow teacher, 75% of male teachers consult a specialist computer teacher for help while only 38% of female teachers do. The majority of female teachers prefer to ask another teacher who is not a specialist.

Table 5.30**Gender * Do you send emails to your students? * Age Crosstabulation**

Count

			Do you send emails to your students?			Total
			Yes, often	No	Yes, sometimes	
Age	Gender	Male				
		Female				
		Total				
under 30			1	2	0	3
			3	5	3	11
			4	7	3	14
30 - under 40			0	0	1	1
			3	5	3	11
			3	5	4	12
40 - under 50			1		0	1
			0		2	2
			1		2	3
over 50				0	1	1
				1	0	1
				1	1	2

The percentage of male teachers using emails to communicate with students, 67%, is greater than that of the female teachers, 56% (see Table 5.30). It is often claimed that younger people are more enthusiastic in the use of new technology than older ones. However, in this case the largest age group of teachers who do not use emails to contact their students is the youngest age group of those under 30 years old.

Table 5.31**Gender * Do you send emails to your colleagues? * Age Crosstabulation**

Count

Age			Do you send emails to your colleagues?		Total
			Yes	No	
under 30	Gender	Male	1	2	3
		Female	7	4	11
	Total		8	6	14
30 - under 40	Gender	Male	0	1	1
		Female	6	5	11
	Total		6	6	12
40 - under 50	Gender	Male	1	0	1
		Female	0	2	2
	Total		1	2	3
over 50	Gender	Male		1	1
		Female		1	1
	Total			2	2

Over half of the female teachers said they used email communication with their colleagues whereas only 33% of the male teachers do (see Table 5.31). This analysis shows that it tends to be teachers who are not in the youngest age group who are most likely not to use this method. It is possible that they have already established other methods of communication with their colleagues that they are comfortable with and have no desire to change.

It seems likely, from the experience of organisations in other countries, that the sending of emails between teachers and students will soon proliferate.

Table 5.32**Gender * Do you send emails to parents? * Age Crosstabulation**

Count

Age			Do you send emails to parents?			Total
			Yes	No	No response	
under 30	Gender	Male	0	3		3
		Female	2	9		11
	Total		2	12		14
30 - under 40	Gender	Male	1	0		1
		Female	1	10		11
	Total		2	10		12
40 - under 50	Gender	Male		1	0	1
		Female		1	1	2
	Total			2	1	3
over 50	Gender	Male		1		1
		Female		1		1
	Total			2		2

Even in the context of the small proportion of teachers, slightly less than 13%, who send emails to parents it is significant that these teachers are all in the two youngest age groupings and under forty years old as well as 75% of them being female (see Table 5.32). It is unwise to make wide ranging conclusions from these figures at this stage particularly since this form of communication with parents will inevitably, because of demands from parents and the management of schools, increase greatly and speedily.

Table 5.33**Gender * Do you use an Interactive Whiteboard in your lessons? * Age Crosstabulation**

Count			Do you use an Interactive Whiteboard in your lessons?			Total
Age			Yes	No	No response	
under 30	Gender	Male	0	3		3
		Female	3	8		11
	Total		3	11		14
30 - under 40	Gender	Male	0	1	0	1
		Female	3	5	3	11
	Total		3	6	3	12
40 - under 50	Gender	Male	0	1		1
		Female	1	1		2
	Total		1	2		3
over 50	Gender	Male		0	1	1
		Female		1	0	1
	Total			1	1	2

It is very interesting that all the teachers who use an interactive whiteboard in their lessons are female (see Table 5.33); even more so is the fact that they span all the age groups. Although this is certainly significant at this stage it is unlikely that this situation will remain unchanged. Interactive whiteboards have only been recently introduced into classroom in Chinese schools and their adoption as a very effective way of using ICT in the curriculum will undoubtedly spread quickly through urban areas. When this happens it will not remain as an all female teacher domain.

5.3.3 Conclusions

The profile of the age, gender, teaching experience and subject specialities of the teachers in this sample were consistent with those teaching in middle schools in cities in northern China generally. The conditions of anonymity for the teachers who responded to the questionnaires would give some credibility to the responses and of

the how they represent the opinions and attitudes of teachers generally in these schools.

What is immediately obvious is that the policy of providing the equipment necessary for the implementation of ICT into the school curriculum would appear to be working well with three out of the four schools in the survey having good ICT facilities and over 80% of teachers having their own computer. Over 60% of teachers are able to use a computer suite at the school at any time they want.

The use to which this equipment is being put is more variable. All the teachers responded that ICT helped them in their teaching and that they liked to use computers in their lessons. However, less than 90% claimed to actually use a computer in their teaching, with the rest, presumably, using one for lesson preparation or something similar. It is apparent that the interactive whiteboard is a relatively new piece of classroom technology with 20% of teachers using one; interestingly all these teachers are female.

What is surprising is the relatively limited use teachers make of communicating by email. Less than half the teachers use this facility to communicate with other teachers, a quarter send messages to their students and 10% make contact with parents in this way. More female than male teachers use email to contact colleagues and parents; whereas the situation is reversed when teachers contact students by email.

5.4 Quantitative analysis for the students

5.4.1 Statistical analysis of the questions on the students' questionnaire

Table 5.34 Question 1

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	86	36.3	36.3	36.3
	Female	151	63.7	63.7	100.0
	Total	237	100.0	100.0	

The distribution of gender in the sample of students surveyed in China is weighted in favour of the girls; however, there are a large enough number of both sexes for generalisations from the analysis to be made with some confidence (see Table 5.34).

Table 5.35 Question 2

Age in years

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10 - 12	11	4.6	4.6	4.6
	13 - 14	51	21.5	21.5	26.2
	15 - 16	116	48.9	48.9	75.1
	17 - 18	59	24.9	24.9	100.0
	Total	237	100.0	100.0	

Children start in middle schools in China at the age of twelve, but some younger children, even as young as ten, who are of well above average ability, are admitted. This is why the first class interval in the above table (see Table 5.35) starts at ten years old. However, these much younger children are very small in number and so the frequency in the first group is smaller than the rest. The fifteen to eighteen years old age group contains twice the number of the remaining groups but this should not

result in bias in the analysis of the data where predominantly proportions are explored. The frequencies of the other groups are statistically adequate.

Table 5.36 Question 3

Do you use a computer for your homework?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	70	29.5	29.5	29.5
No	92	38.8	38.8	68.4
Sometimes	73	30.8	30.8	99.2
No response	2	.8	.8	100.0
Total	237	100.0	100.0	

Over 60% of the survey (see Table 5.36) used a computer to help with their homework to a greater or lesser extent. While this is a large proportion it is still surprising that almost 40% do not avail themselves of this technology even when there is a computer at home.

Table 5.37 Question 4

For how many years have you used a computer?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0 - 1	80	33.8	33.8	33.8
2 - 4	103	43.5	43.5	77.2
5 - 7	32	13.5	13.5	90.7
more than 7	21	8.9	8.9	99.6
No response	1	.4	.4	100.0
Total	237	100.0	100.0	

Even though slightly over 30% of the students are in the very early stages of developing their ICT skills (see Table 5.37) the rest have already had a great deal exposure to computers and experience of the uses to which they can be put. The use of ICT in the educational context should hold no fears for them.

Table 5.38 Question 5

Does the computer help your studies?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	145	61.2	61.2	61.2
No	29	12.2	12.2	73.4
Not sure	60	25.3	25.3	98.7
No response	3	1.3	1.3	100.0
Total	237	100.0	100.0	

This question (see Table 5.38) has resulted in a very positive result. Over 60% are certain that computers help them in their studies while another 25% are still not sure. The high figure is possibly due in part to the attraction new technology has for teenage children. This leaves just over 10% of the survey not convinced of the benefits ICT can bring to their education. At this stage in the integration of ICT into the curriculum of schools in China this shows that teachers are already using the technology effectively to enhance the teaching and learning experiences for their students.

Table 5.39 Question 6

How many students share a computer in lessons?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 each	217	91.6	91.6	91.6
Several	4	1.7	1.7	93.2
Don't know	14	5.9	5.9	99.2
No response	2	.8	.8	100.0
Total	237	100.0	100.0	

Overwhelmingly, the experiences of the students in the survey (see Table 5.39) are that they can work at their own computer in their lessons. Over 90% of students being able to say this shows how determined the schools are in making ICT an integral part of the curriculum. Although some shared use can be of benefit with students being

able to help each other directly, it is possible that a more dominant student could take over the use of the computer and leave the others out. The researcher noticed, in her lesson observation, that students working at their own machines appeared more than willing to help each other and demonstrate their skills.

Table 5.40 Question 7
Do you understand what ICT means?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	77	32.5	32.5	32.5
No	144	60.8	60.8	93.2
Slightly	16	6.8	6.8	100.0
Total	237	100.0	100.0	

Although 60% of the survey (see Table 5.40) claim they do not know the meaning of ICT this hides the fact that they appear to use computers competently and have done for some time. It suggests that the concept of ICT is unfamiliar rather than the technology that underpins it. They also appreciate that computers, in other words ICT, are a help with their studies.

Table 5.41 Question 8
Does your school have a campus network?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	160	67.5	67.5	67.5
No	27	11.4	11.4	78.9
Don't know	49	20.7	20.7	99.6
No response	1	.4	.4	100.0
Total	237	100.0	100.0	

It is perhaps surprising that 20% of the students (see Table 5.41) do not know if their school has a campus network or not. Some of them may in fact be using the network without realising it.

Table 5.42 Question 9

Do you like to use a computer in your lessons?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	156	65.8	65.8	65.8
No	40	16.9	16.9	82.7
Sometimes	41	17.3	17.3	100.0
Total	237	100.0	100.0	

This, as shown by Table 5.42, is a very positive response to the integration of ICT into the curriculum. The disappointment is that a third of the students are not so positive about using computers in lessons, while 17% simply do not like to. One causative factor is possibly the enthusiasm or expertise of the teacher trying to incorporate ICT into the lesson. Any failings here will have a detrimental effect on the lesson itself and on the learning experiences of the students.

Table 5.43 Question 10

Can you access the Internet on the computers at school?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	71	30.0	30.0	30.0
Sometimes	100	42.2	42.2	72.2
No	63	26.6	26.6	98.7
No response	3	1.3	1.3	100.0
Total	237	100.0	100.0	

One of the great advantages of ICT for schools is the wealth of information that can be found on the Internet. The availability of Internet access is of major importance for the teachers and students. Having only 30% of computers that can connect with the

Internet (see Table 5.43) must cause frustration to everyone and limit the positive effect ICT should have on the whole school communities.

Table 5.44 Question 11

How do you solve computer problems at school?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Ask the computer teacher	63	26.6	26.6	26.6
Ask other teachers	71	30.0	30.0	56.5
By myself	69	29.1	29.1	85.7
Other ways	32	13.5	13.5	99.2
No response	2	.8	.8	100.0
Total	237	100.0	100.0	

The students would seem to use many ways to solve problems they encounter when using computers at school (see Table 5.44). It appears that they are not reluctant to ask teachers for help and make efforts to work through the problems themselves. This suggests that the students have confidence when working with the new technology and are not afraid of experimenting.

Table 5.45 Question 12

Do you send emails to your classmates?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes, often	113	47.7	47.7	47.7
No	54	22.8	22.8	70.5
Sometimes	65	27.4	27.4	97.9
No response	5	2.1	2.1	100.0
Total	237	100.0	100.0	

The fact that only slightly over 20% of students do not communicate by email with their classmates (see able 5.45) suggests how quickly this facet of ICT is being exploited by them. The students have seen how effective this method of communication is and have been eager to take advantage of it.

Table 5.46 Question 13

Do you send emails to your teachers?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	33	13.9	13.9	13.9
No	202	85.2	85.2	99.2
No response	2	.8	.8	100.0
Total	237	100.0	100.0	

It is revealing that while only 14% of students use email to communicate with their teachers (see Table 5.46) nearly double that percentage of teachers send emails to their students (see Table 5.15). What type of communication these are was outside the scope of this research project, but they were prompted by work done in class and the directions of the teachers.

Table 5.47 Question 14

Do you send emails to your parents?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	42	17.7	17.7	17.7
No	195	82.3	82.3	100.0
Total	237	100.0	100.0	

This (see Table 5.47) is not an unexpected response to the question. Along with the previous two questions, it reveals who the students like to communicate with and, as in most places in the world, this is usually other members of their peer group.

Table 5.48 Question 15

Have you made any friends from using the Internet?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	110	46.4	46.4	46.4
No	127	53.6	53.6	100.0
Total	237	100.0	100.0	

As well publicised cases in the UK and other countries have shown, the forming of friendships through the Internet has many hidden dangers. The obvious one being that the only information about the other person is what they say about themselves; this can be far from the truth. However, almost half the students in the survey (see Table 5.48) are prepared to form friendships in this way.

Table 5.49 Question 16

Does your school give special training to students in using computers?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	100	42.2	42.2	42.2
No	134	56.5	56.5	98.7
No response	3	1.3	1.3	100.0
Total	237	100.0	100.0	

The responses to previous questions indicate that the vast majority of the students surveyed use computers to a greater or lesser extent. The fact that only 40% have special training in school (see Table 5.49) indicates that most learn by themselves or with the help of their friends and families. This shows the effectiveness of learning how to use a computer outside the normal school routine.

Table 5.50 Question 17

What sort of computer do you have at home?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Laptop	27	11.4	11.4	11.4
PC; no laptop	180	75.9	75.9	87.3
Don't have one	30	12.7	12.7	100.0
Total	237	100.0	100.0	

Only 12% of students do not have access to a computer in their own homes (see Table 5.50). It is worth bearing in mind that this is the situation in large cities; the figure in

the remoter rural areas, where the families tend to have much less disposable income, is likely to be far different; this is the situation observed by the researcher when she has had chance to make visits to schools in rural areas. It is apparent that parents realise that having a computer at home does help their children with most facets of their schoolwork.

Table 5.51 Question 18

When can you use the computer at home?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Any time	151	63.7	63.7	63.7
Weekends	13	5.5	5.5	69.2
Sometimes	31	13.1	13.1	82.3
Never	39	16.5	16.5	98.7
No response	3	1.3	1.3	100.0
Total	237	100.0	100.0	

It is clear that the great majority of the students can use the computer in their homes with less than 3% not being allowed to (see Table 5.51). Almost 73% of the homes with a computer allow their children to use it whenever they wish while less than 5% are not allowed to use it at all. Parents appear to see the advantages of ICT in education and are prepared to give their children what help they can in this regard. That a small number of students are limited to using the home computer can be due to many factors. However, two main factors could be that the parents use the machine themselves for work during the week and also that they want their children to concentrate on their homework on weekdays and allow more in depth work, including using the computer, at weekends.

Table 5.52 Question 19

Do you like your teachers to use a Whiteboard in your lessons?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	63	26.6	26.6	26.6
No	115	48.5	48.5	75.1
Don't know	59	24.9	24.9	100.0
Total	237	100.0	100.0	

The major outcome of this question (see Table 5.52); that only 27% gave a positive response and almost half had negative views, was unexpected. A check against the other variables to attempt to find the reasons for this is necessary. Without further information it is possible that the expertise of the teachers when using interactive whiteboards is still in its early stages and therefore the quality of the teaching and learning experiences has not reached its potential.

Table 5.53 Question 20

How can you use the internet out of school?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid At home	190	80.2	80.2	80.2
Internet cafe - not home	19	8.0	8.0	88.2
I don't	28	11.8	11.8	100.0
Total	237	100.0	100.0	

The Internet is a powerful resource for students and, with 80% being able to access it at home (see Table 5.53), parents recognise it as such. It is important to acknowledge that the home is a relatively regulated and monitored place from which students can be allowed to use the Internet and so be protected from potential hazards; this point is particularly important for the safety of younger students.

Table 5.54 Question 21

Do all your subject teachers use a computer in their lessons?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	107	45.1	45.1	45.1
	No	106	44.7	44.7	89.9
	Some	24	10.1	10.1	100.0
	Total	237	100.0	100.0	

The results of this question (see Table 5.54) suggest that, from the students' perspective, well over half the teachers use computers in their lessons with 80% of those using them all the time. Although very encouraging in the sense that this uptake of ICT into the curriculum by the teachers has been rapid it still falls a little short of satisfying the students' desire for their teachers to use computers. The research was not able to identify which subject areas used computers in their lessons most.

5.4.2 Comparative analysis of the responses given by the students

Having analysed the responses to the individual questions on the students' questionnaire a more detailed investigation, particularly regarding the effect of gender and age on the responses, had to be undertaken as was done for the corresponding questionnaire for the teachers. Again, many of these comparative tables had outcomes which were of no consequence and have therefore not been recorded. All the ones from which an analysis was meaningful are been reported in detail and since the chi-square tests were inconclusive and they have not been included.

Table 5.55**Gender * Do you use a computer for your homework? * Age in years Crosstabulation**

Count

Age in years			Do you use a computer for your homework?				Total
			Yes	No	Sometimes	No response	
10 - 12	Gender	Male	1	0	4		5
		Female	3	3	0		6
		Total	4	3	4		11
13 - 14	Gender	Male	8	7	10	1	26
		Female	8	7	10	0	25
		Total	16	14	20	1	51
15 - 16	Gender	Male	20	14	7		41
		Female	19	34	22		75
		Total	39	48	29		116
17 - 18	Gender	Male	1	8	5	0	14
		Female	10	19	15	1	45
		Total	11	27	20	1	59

There is a large difference, as can be seen from Table 5.55, in the percentages of boys and girls using a computer to help them with their homework; 35% of boys regularly do so while only 26% of girls responded positively. When those who sometimes use the computer in doing their homework are included in the analysis the percentages become 65% for boys and 58% for the girls. Although the difference is now slightly less than it was before, the conclusion is inevitably that boys are making more use of computers in their homework than are the girls. The differences in the age groups are quite marked; the proportion of those who use the computer, including those who sometimes use one, in the younger two age groups is over 70% but this falls to 59% for the 15 to 16 years old and further to 52% for the over 16 years old students. It is a possibility that there is a tendency for the older students to rely more upon the traditional methods particularly when important examinations are imminent.

Table 5.56**Gender * For how many years have you used a computer? * Age in years Crosstabulation**

Count

Age in years		For how many years have you used a computer?					Total
		0 - 1	2 - 4	5 - 7	more than 7	No response	
10 - 12	Gender Male	0	5	0			5
	Female	1	1	4			6
	Total	1	6	4			11
13 - 14	Gender Male	5	16	2	3		26
	Female	8	9	7	1		25
	Total	13	25	9	4		51
15 - 16	Gender Male	17	14	7	2	1	41
	Female	31	30	10	4	0	75
	Total	48	44	17	6	1	116
17 - 18	Gender Male	3	7	1	3		14
	Female	15	23	2	5		45
	Total	18	30	3	8		59

The increasing exposure students have to using computers is clearly shown from Table 5.56. In the youngest age group 35% of the students have been using a computer for more than 4 years while the corresponding figure for the oldest age group is just 19%. Of those students who are in their first year of using a computer over 82% are over fourteen years old. In the 12 years old and under age group no boys have used a computer for more than 4 years while 67% of girls have done so. For the students between 13 and 14 years old 19% of boys and 32% of girls have used a computer for more than 4 years. For students older than this the position changes; in the 15 to 16 years old age group 24% of boys and 19% of girls have used one for more than 4 years, while in the oldest age group, of students older than 16, 29% of boys and only 16% of girls have used one for the same length of time. For young students, using ICT generally will soon become a natural part of their lives.

Table 5.57**Gender * Does the computer help your studies? * Age in years Crosstabulation**

Count

Age in years			Does the computer help your studies?				Total
			Yes	No	Not sure	No response	
10 - 12	Gender	Male	5				5
		Female	6				6
		Total	11				11
13 - 14	Gender	Male	18	0	7	1	26
		Female	21	1	3	0	25
		Total	39	1	10	1	51
15 - 16	Gender	Male	27	4	10		41
		Female	50	10	15		75
		Total	77	14	25		116
17 - 18	Gender	Male	5	4	5	0	14
		Female	13	10	20	2	45
		Total	18	14	25	2	59

A similar situation as in a previous cross tabulation (see Table 5.55) would appear to exist when students are faced with the question of ICT helping with studying (see Table 5.57). Whereas only 9% of the boys said that it did not 14% of girls gave the same response. Although the overall percentage of 86% of all respondents were positive in their views of the help computers can be in studying, there is a significant gender difference. It is also apparent that the age of students is a factor when considering if computers help in their studies. The negative responses to the question come from those over 12 years old with 16% of students over 14 years old saying computers did not help with their studies. This compares with only 2% of those under 15 saying that computers do not help. This is a very striking confirmation that the younger students in Chinese middle schools are very positive about incorporating ICT into their studies.

Table 5.58**Gender * Do you like to use a computer in your lessons? * Age in years
Crosstabulation**

Count			Do you like to use a computer in your lessons?			Total
Age in years			Yes	No	Sometimes	
10 - 12	Gender	Male	4	1	0	5
		Female	5	0	1	6
	Total	9	1	1	11	
13 - 14	Gender	Male	24	1	1	26
		Female	15	8	2	25
	Total	39	9	3	51	
15 - 16	Gender	Male	32	7	2	41
		Female	49	15	11	75
	Total	81	22	13	116	
17 - 18	Gender	Male	7	0	7	14
		Female	20	8	17	45
	Total	27	8	24	59	

There is a strong gender difference in the response to the question ‘Do you like to use a computer in your lessons’ (see Table 5.58). A resounding 78% of male students answered in the affirmative while only 59% of the female students were as certain. Almost 21% of the female students were certain they did not like to use computers in lessons, which is twice the percentage of male students with the same response.

There is also a significant difference in the responses of different age groups. While 77% of those students under 15 years old were positive about liking ICT in their lessons only 62% of the older students were sure. This is a similar situation to the analysis of Table 5.57; younger students are positive about the educational uses of ICT.

Table 5.59

**Does the computer help your studies? * Do you like to use a computer in your lessons?
Crosstabulation**

Count		Do you like to use a computer in your lessons?			Total
		Yes	No	Sometimes	
Does the computer help your studies?	Yes	101	27	17	145
	No	13	7	9	29
	Not sure	41	6	13	60
	No response	1	0	2	3
Total		156	40	41	237

Although most of the content of Table 5.59 is as to be expected one element is a surprise. That is the 27 students who say the computer helps in their studies but do not like to use a computer in their lessons. That is to say almost 20% of the students who consider the computer helps in their studies prefer to use one outside lessons, presumably to help with their homework and to use the Internet to search for information.

Table 5.60

How many years have you used a computer? * Do you like to use a computer in lessons? Crosstabulation

Count		Do you like to use a computer in lessons?			Total
		Yes	No	Sometimes	
How many years have you used a computer?	0 - 1	63	9	8	80
	2 - 4	63	18	24	105
	5 - 7	18	10	5	33
	more than 7	11	3	4	18
	No response	1	0	0	1
Total		156	40	41	237

There is a trend shown by Table 5.60 when the focus is on the students who do not like to use computers in their lessons. The lowest percentage in this section of data is 11% from those in their first year of using a computer. This figure maximises at 30%

for those students who have been using a computer for between 5 and 7 years, and then lessens again for the next group. The reason for this trend could be that the students consider that they have better ICT skills than their teachers and so are not enthused by these lessons.

Table 5.61

Gender * How do you solve computer problems at school? * Age in years Crosstabulation

Count

			How do you solve computer problems at school?					Total
			Ask the computer teacher	Ask other teachers	By myself	Other ways	No response	
Age in year:	Gender	Male	2	0	2	1	0	5
		Female	0	3	1	1	1	6
		Total	2	3	3	2	1	11
13 - 14	Gender	Male	7	6	13	0		26
		Female	12	6	4	3		25
		Total	19	12	17	3		51
15 - 16	Gender	Male	6	15	12	7	1	41
		Female	29	21	19	6	0	75
		Total	35	36	31	13	1	116
17 - 18	Gender	Male	2	4	3	5		14
		Female	5	16	15	9		45
		Total	7	20	18	14		59

When students encounter technical problems or difficulties with software applications it is important that they have the confidence to be able to solve them. It can be seen from this analysis (see Table 5.61) that 29% of the students over 12 years old have enough confidence in their own abilities with ICT to solve problems themselves and this proportion is approximately the same for all three relevant age groupings.

Whereas the proportion of boys solving their own problems is 36% there are only 26% of girls relying on their own skills. This situation is reversed when asking for help. Girls, at 61%, are more likely to ask a teacher for help than the boys, 49%. 30%

of the girls ask an expert computer teacher for help in solving problems while only 20% of boys seek out this expertise. This selection, of which teacher to ask for help, will depend to a great extent on the personal and professional relationships that have developed between teachers and their students.

Table 5.62

Gender * Do you send emails to your classmates? * Age in years Crosstabulation

Count			Do you send emails to your classmates?				Total
			Yes, often	No	Sometimes	No response	
10 - 12	Gender	Male	4	0	1		5
		Female	2	3	1		6
		Total	6	3	2		11
13 - 14	Gender	Male	16	6	4		26
		Female	13	6	6		25
		Total	29	12	10		51
15 - 16	Gender	Male	20	11	10		41
		Female	33	19	23		75
		Total	53	30	33		116
17 - 18	Gender	Male	7	2	5	0	14
		Female	18	7	15	5	45
		Total	25	9	20	5	59

Here (see Table 5.62) there is a difference in the responses from the different genders. The 'yes, often' response of 55% from the male students is much larger than that of the female students of 44%. This difference decreases considerably to 78% as opposed to 74% when the 'sometimes' response is added in.

When adding the 'Yes, often' and 'Sometimes' responses together the proportions applicable to the different age groups all lie between 73% and 76%. There is also a similarity between the genders in the age groups, except for the youngest one, for this composite response.

It is probable that email communications are still at the developmental stage and that some students are still somewhat wary of the technology; however, mobile telephones and their facilities to send text messages are much more convenient for the students to use on a regular basis.

Table 5.63

Gender * Do you send emails to your teachers? * Age in years Crosstabulation

Age in years			Do you send emails to your teachers?			Total
			Yes	No	No response	
10 - 12	Gender	Male	1	4		5
		Female	1	5		6
	Total		2	9		11
13 - 14	Gender	Male	4	22	0	26
		Female	9	15	1	25
	Total		13	37	1	51
15 - 16	Gender	Male	4	36	1	41
		Female	11	64	0	75
	Total		15	100	1	116
17 - 18	Gender	Male	1	13		14
		Female	2	43		45
	Total		3	56		59

The situation that is shown in the previous table (see Table 5.62) is reversed when comparing the gender of students and if they send emails to teachers (see Table 5.63). In this instance female students are more likely, at 15%, to send emails to their teachers than male students, at 12%. In both instances the percentages at present are small and noticeably less than that of the teachers who send emails to their students which is 26% (see Table 5.15). The age group with the largest difference between the genders is the 13 to 14 years old one. Here 36% of girls contact their teachers with emails while 15% of the boys do. The comparable situation is much closer in the other age groups.

Table 5.64

**Gender * Do you send emails to your parents? * Age in years
Crosstabulation**

Count

Age in years			Do you send emails to your parents?		Total
			Yes	No	
10 - 12	Gender	Male	1	4	5
		Female	1	5	6
	Total		2	9	11
13 - 14	Gender	Male	9	17	26
		Female	7	18	25
	Total		16	35	51
15 - 16	Gender	Male	6	35	41
		Female	12	63	75
	Total		18	98	116
17 - 18	Gender	Male	1	13	14
		Female	5	40	45
	Total		6	53	59

Although only 18% of students overall send emails to their parents (see Table 5.64), again, as in Table 5.62, it is the male students who are more likely, at 20%, to do this rather than the female students, of whom 17% communicate in this way. Students in the 13 to 14 years old age group are the most likely, at 31%, to contact their parents by email, with the proportion of boys in this group being 35%.

Table 5.65

Gender * Have you made any friends from using the Internet? * Age in years Crosstabulation

Count

Age in years			Have you made any friends from using the Internet?		Total
			Yes	No	
10 - 12	Gender	Male	3	2	5
		Female	1	5	6
	Total	4	7	11	
13 - 14	Gender	Male	12	14	26
		Female	9	16	25
	Total	21	30	51	
15 - 16	Gender	Male	18	23	41
		Female	38	37	75
	Total	56	60	116	
17 - 18	Gender	Male	4	10	14
		Female	25	20	45
	Total	29	30	59	

This table (see Table 5.65) shows a slight gender difference when students have formed friendships when using the Internet. 48% of female students have made friends in this way whereas only 43% of male students have. The reasons why this might be so are outside the remit of this research. The analysis also shows a definite trend in that the percentage of students making friends in this way increases steadily with the ages of the students. In the youngest age group of the analysis 36% of students in the survey responded positively. This figure rises to 49% for the students in the oldest year grouping. Part of the reason for this steady increase could be attributed to the increasing confidence and social awareness of the students as they grow older.

Table 5.66**Gender * What sort of computer do you have at home? * Age in years Crosstabulation**

Count			What sort of computer do you have at home?			Total
Age in years			Laptop	PC; no laptop	Don't have one	
10 - 12	Gender	Male	5	0		5
		Female	1	5		6
Total			6	5		11
13 - 14	Gender	Male	3	18	5	26
		Female	5	16	4	25
Total			8	34	9	51
15 - 16	Gender	Male	4	32	5	41
		Female	4	61	10	75
Total			8	93	15	116
17 - 18	Gender	Male	1	12	1	14
		Female	4	36	5	45
Total			5	48	6	59

The analysis of previous questions showed that there is a gender difference in the use students make of computers in their studies. This difference cannot be explained by the access students have to ICT at school and in their homes. It must be assumed that students have the same opportunities to use computers while at school and the table above (see Table 5.66) clearly shows that the same percentage, 87%, of both girls and boys have homes where there is a computer. Parents being very supportive of their children, especially in education, would eliminate parental disapproval as a reason for girls not using computers in their studies as much as the boys do. The conclusion must be that, for whatever reason, there is a disinclination for girls to use computers in their studies as much as boys.

The analysis of this table also shows that, apart from the youngest age group, in the other age groups just a few homes, and in approximately the same ratio as students in the groups, are without a computer for the students to use. The result of this is that,

except for the first age group, between 10% and 18% of students cannot use a computer at home to help with their homework. These statistics are much lower than would be needed to suppose that this factor, of not having a computer in the home, is the sole reason for students not using computers for their homework.

Table 5.67

Gender * When can you use the computer at home? * Age in years Crosstabulation

Age in years			When can you use the computer at home?					Total
			Any time	Weekends	Sometimes	Never	No response	
10 - 12	Gender Male		5					5
	Female		6					6
	Total		11					11
13 - 14	Gender Male		22	1	1	2		26
	Female		14	3	0	8		25
	Total		36	4	1	10		51
15 - 16	Gender Male		25	1	4	9	2	41
	Female		44	3	15	13	0	75
	Total		69	4	19	22	2	116
17 - 18	Gender Male		9	2	1	1	1	14
	Female		26	3	10	6	0	45
	Total		35	5	11	7	1	59

There is quite a marked difference between the genders of the students who can use the home computer at any time (see Table 5.67). While only 60% of female students are allowed to do so, 71% of the male students have this privilege. When other occasional times when the students can use the computer are added to this figure the situation for both genders becomes virtually identical at between 82% and 83%.

Excepting the youngest age group, in which all the students are allowed to use the computer at any time, the proportion of boys in all the age groups who are allowed to use the computer at any time, between 85% and 61%, is always greater than that of

the girls, varying from 59% to 56%. Therefore the analysis in the preceding paragraph is true for all the age groups and not just specific ones.

Table 5.68

**When can you use the computer at home? * Do you use a computer for your homework?
Crosstabulation**

Count		Do you use a computer for your homework?				Total
		Yes	No	Sometimes	No response	
When can you use the computer at home?	Any time	51	58	42	0	151
	Weekends	2	8	2	1	13
	Sometimes	8	11	12	0	31
	Never	9	13	16	1	39
	No response	0	2	1	0	3
Total		70	92	73	2	237

Almost 64% of the students in the survey say they are allowed to use the home computer at any time they wish (see Table 5.68). This table is significant in that it shows that 38% of these students make no use of this facility when they are doing their homework and only 33% unequivocally state that they do use the computer. Since many students do take advantage of the computer in their homes when doing their homework it suggests that they find it helpful. It does raise the question as to why so many students in the same situation make no use of the computer. The questionnaires were completed anonymously and so it is impossible, from the responses, to make an analysis of the specific teaching and learning environments at the schools to see what factors can influence this use of the home computer.

Table 5.69

Gender * Do you like your teachers to use a Whiteboard in your lessons? * Age in years Crosstabulation

Count

Age in years			Do you like your teachers to use a Whiteboard in your lessons?			Total
			Yes	No	Don't know	
10 - 12	Gender	Male	2	2	1	5
		Female	0	4	2	6
	Total		2	6	3	11
13 - 14	Gender	Male	6	18	2	26
		Female	7	11	7	25
	Total		13	29	9	51
15 - 16	Gender	Male	13	18	10	41
		Female	19	38	18	75
	Total		32	56	28	116
17 - 18	Gender	Male	4	4	6	14
		Female	12	20	13	45
	Total		16	24	19	59

The youngest age group in the classification gave by far the lowest positive response of 18% of all the age groups when asked if they liked teachers using an interactive whiteboard in their lessons (see Table 5.69). The proportions of positive responses from the other age groups were all above 25%.

The proportion of boys who are positive about teachers using interactive whiteboards was 29% whereas that of the girls was 25%. The proportionate responses of the boys varied between 23% and 40% across the groups while those of the girls, excluding the first group, were consistently around 27%.

Again, the teaching methodologies of the different schools as well as the expertise of the individual teachers in using ICT in the classroom may be major factors in the students' varying experiences of the use of interactive whiteboards. Given that this

technology has only recently been introduced into Chinese schools it is probably too early to make definitive conclusions from this section of the research.

Table 5.70

Gender * How can you use the internet out of school? * Age in years Crosstabulation

Count			How can you use the internet out of school?			Total
Age in years			At home	Internet cafe - not home	I don't	
10 - 12	Gender	Male	4		1	5
		Female	6		0	6
	Total		10		1	11
13 - 14	Gender	Male	17	3	6	26
		Female	17	1	7	25
	Total		34	4	13	51
15 - 16	Gender	Male	29	5	7	41
		Female	48	13	14	75
	Total		77	18	21	116
17 - 18	Gender	Male	12	2	0	14
		Female	36	3	6	45
	Total		48	5	6	59

The proportions of both male and female students who use the home computer to access the Internet (see Table 5.70) are almost the same at 72% and just below 71% respectively. This same equality of gender applies to those students who go to an Internet café where the proportion is approximately 12%.

The students who choose to go to an Internet café are predominantly from the 15 to 16 years old age group. Table 5.66 shows that, in this age group, 101 students have access to a computer at home. Therefore it is apparent that 24, that is 21%, chose not to use the computer at home and preferred to go to an Internet café instead. There will be many factors at play for them coming to this decision and social reasons may very well come high on this list.

5.4.3 Conclusions

There are more girls than boys in the sample of students who returned completed questionnaires. However, there are enough in both groups to be able to make a reliable analysis of their responses and there is a reasonable proportion of students in each age group.

The students have a wide access to computers with almost 90% of their homes having a computer and two thirds of the students have over one year's experience of using one. The great majority of students say a computer helps with their studies and homework and like using them in lessons. This is a complete endorsement for the use of ICT in the curriculum from the students' perspective. The proportion of boys who view computers positively in the studies as a whole is greater than that of the girls.

Almost half the students regularly contact each other by email and another quarter do so sometimes. Slightly over 10% send emails to their teachers, which is half the proportion of teachers who send emails to them. Boys are more likely to contact each other by email than girls but the opposite is true when they contact teachers in this way. Most are able to access the Internet when not at school and half have formed friendships in this way.

The students seem to have readily adapted to this technology and using a computer appears to have become normal part of their everyday lives.

5.5 Summary

The methods of analysis of the quantitative data have been described in this chapter. The two sets of data collected by means of a questionnaire distributed to the teachers and a different one distributed to the students were extensively analysed statistically using the SPSS package. These analyses were conducted separately on the two sets of data with no attempt being made to combine the two.

The results of the analysis of each individual question were tabulated and presented along with a written description which highlighted the reasonable deductions that could be made from the analysis. Where appropriate the comments included views on the social context behind the question and the responses to it. A more detailed analysis was undertaken to examine what influence, if any, the gender and age of the respondents had on the responses they gave to the questions. The results of these analyses were presented in tabular form along with an appropriate written description of what they might suggest. At times these comments included possible references to social contexts.

The analysis shows that the initiative of integrating ICT in the curriculum of middle schools has been backed by the provision of the necessary equipment with most schools having good facilities. Both teachers and students have good access to computers in their schools and in their homes.

The use of this equipment is varied with less than 90% of teachers saying they used it in their lessons and, at this early stage in its development, the interactive whiteboard being used by only 20% of teachers. The great majority of students, over two thirds,

say they enjoy using computers in their studies and at home, with the boys being rather more positive about ICT than the girls. This demonstrate that, generally, the teaching and learning methodologies that the teachers have adopted to include the use of ICT, even though much will be in the early stages of development, have been effective and the students have enjoyed these new learning experiences.

The Internet is being used regularly by both teachers and students. What is rather surprising is that only half of the teachers use email to make contact with each other and the same proportion of students do the same. While a quarter of teachers send emails to their students only half of this proportion of students contact their teachers in this way. There are gender differences in the use of email communications but these do not appear to be significant.

It would appear that students and teachers have adapted to using ICT in their working and social lives.

This is to be followed up in the next chapter with an analysis of the qualitative data. This data was collected by a series of semi-structured interviews conducted by the researcher with headteachers, teachers, administrators and students. Those who were interviewed were not necessarily the same as those whose views were collected by the questionnaires. Some of the interviews were conducted in a group scenario. The recording of the interviews was done by the researcher writing notes by hand and in as much detail as possible the comments that were made to her.

The semi-structured interviews were designed to collect opinions in a great deal more depth than was possible by the questionnaires. The interviewees were assured that their identities would not be revealed and that neither would the opinions they voiced be attributed to any specific person or to any particular school.

Chapter Six

Qualitative Analysis

6.1 Introduction

The author visited and collected questionnaires that had been completed by a sample of teachers and students from four schools in two big cities in northern China. They cities are Beijing and Shenyang; both located in very developed areas in the northeast and of China.

Three head teachers, one administrator, ten teachers and twelve of the students of these four schools have been interviewed. The process included one group interview as well as individual interviews conducted by the researcher in order to gain more detailed opinions from the interviewees.

The aim of this interview procedure was to provide more depth to the research and this procedure, in conjunction with the collection of quantitative data by means of questionnaires, is known as triangulation. All the interviews were of a semi-structured format.

The researcher held telephone interviews with two computer teachers, who were the writer's former colleagues and whose teaching timetables and the availability of the

researcher did not allow for the interviews to take place during the normal school day. They gave a great deal of help and information on what was happening as regards to information and communications technology in their schools, as well as in cities in China generally, during the time the author had been away. They both seemed happy with the changes in the use of computers in education that had taken place in China.

Three lesson observations were also undertaken by the researcher, these being of an English class, a Chinese class and a geography class during a visit to China; it was regrettable that there was not time to observe more classes using computers as part of their lessons.

China is a big country and consequently progress is sometimes uneven. Computer education has developed very quickly in the big cities but changes have been slower in the more remote countryside so it should be emphasised that the results presented and discussed in this chapter apply only to schools in urban conurbations in China.

6.1.1 School A

It has modern equipment for live coverage of events. They can transmit all kinds of programmes to every classroom and relay teaching and learning activities throughout the school. For example the head teacher's speech, different programmes from Sky TV, news broadcasts and lessons given by experienced teachers so others can observe good practice can be relayed to classrooms and other teaching areas.

There are many kinds of video equipment at the school, including multimedia computers, Sky Education and VCR recorders. The headteacher was previously a

physics teacher and is committed to using ICT wherever possible. Every classroom has a control console and a remote control to make use of the computer. The school has a central control room which houses the server for the whole school. Teachers in every classroom have the authority to use the ICT system as they wish. The administration of the school has been converted to digital management. The central machine can allocate all the timetables of the school making it easy to change the schedules when needed. The working system is based on the whole school year plan for classes, teachers and the periodic collection of students' grades. The video monitors in each classroom can be controlled by the central machine as well. There are CCTV cameras installed in every classroom, these are linked through the central server to the headteacher's office. This enables the headteacher to observe any classroom situation he wishes to. Every teacher has been given their own laptop computer by the school.

6.1.2 School B

There are three computer suites in School B; one large conference room and two small meeting rooms are all set up with ICT facilities. There are two computer teachers in charge of the computer suites. The school encourages all the subject teachers to use ICT in their teaching; ICT is one of the teaching evaluations for the teachers in the school at the end of the year. Technical facilities are used quite often compared to five years ago. The headteacher said she always observed the lessons from her office to make sure most of the teachers used this modern technical equipment as often as they could. Since 2004 the school has offered a laptop to each of the teaching staff.

6.1.3 School C

School C has two computer suites, a large conference room and two small meeting rooms. Two computer teachers help the other teachers use ICT, especially when they have problems. The researcher, on a tour of the school, observed that every classroom has a separate computer which links with the central computer room and the headteacher's office. The school has applied for more technical funding from the Local Education Bureau but with no success. Two years ago it received some funds from the students' parents, but nothing last year.

6.1.4 School D

This is the only school in four of the author's research which has no campus computer network. The only one big conference room has no technical equipment. The computer teacher is in charge of the computer suite as well as the conference room. The school's electrician will occasionally help if the only computer teacher in the school is teaching a class.

There is only one computer suite in School D and that is in a very poor condition. The computer suite was built in 1998, and, after two years, the heater in the room was broken during one of the winter holidays causing a lot of damage. Some of the computers had to be thrown away. The school had to apply for financial support to replace the computer suite; all they have received to date is some second hand computers. But another problem is that the computer suite cannot access the Internet. The headteacher's office is the only place where the Internet can be used. The deputy headteacher has to use the same computer if she needs to use the Internet. This school has three big teachers' offices in which the main subject teachers all have a table and

chair for themselves. Each table has a computer on it. There are several small offices for the art and music or the biology teachers, but there are no computers in these areas.

6.1.5 New developments of ICT in the four schools

Before the writer had completed writing up her research there was an opportunity to find out what recent developments had taken place in the four schools.

The most encouraging aspect was that there had been great improvements for School D since her last visit to collect data for the study. The Local Educational Bureau has helped the school with finance to successfully set up its own school campus network. The majority of the staff have had more training in using the new equipment in order that they can make the most effective use of these facilities. The headteacher has arranged a series of internal in-service teacher training courses, focussing on ICT, for the teachers and has also organised an ICT skills competition for all the teachers at the school. All the results of taking part in the training courses and entering the competition will form part of the appraisal scheme for the teachers. This scheme is directly linked to the chances the teachers have of promotion to a higher tier of teaching within the school and the possibility of taking on a more senior role with more responsibilities; these promotional opportunities have the prospect of more remuneration which is an encouragement in itself for the teachers. The new headteacher is quite optimistic about being able to encourage the teachers at his school to incorporate ICT into their teaching and learning programmes. Every classroom now has an interactive whiteboard and the one conference room in the school has been redecorated and fully equipped with up-to-date technology. The

school has encouraged the teachers to develop their own teaching software packages. At present though the school is experiencing the usual teething problems with the new campus network. However, the headteacher is sure that these will be quickly rectified and they will soon be able to make progress in catching up with the other schools in using ICT for teaching and learning.

The Government is aware that the huge variation of the ICT provision provided by differing schools gives rise to social inequalities, and eventually economic inequalities, among the populations of the cities. Not only can this give rise to discontent, but it could result in a less than effective workforce in the future.

The other three schools' use of ICT in teaching and learning has continued to expand. Every teacher has now been given a laptop by their schools with School A being the first one to adopt this initiative for its teachers. These schools regularly update the computer software that their teachers use and School D plans to do the same thing when finance at the school becomes available.

School C was amalgamated with another two schools in the city, but with each retaining its own campus. The idea was that they should share their expertise and good practices. This has also resulted in an increase in the finance available for the schools, part of which has enabled them to improve their teaching facilities. This amalgamation of schools in order to improve facilities and also to encourage the effective sharing of good teaching practices is becoming more prevalent in the cities in China.

6.2 ICT changed classroom

6.2.1 The changing role of the teachers

Teachers are established as presenters and organisers in their teaching and learning environments. At the same time they have now become part of the audience as well; for part of the lesson the focus of the students and the teacher is the interaction with the computer rather than just the teacher.

Using ICT in the classroom has completely changed our traditional Chinese teaching style. With the use of animations, videos, images, colour and sound I feel I am not only a teacher, I am a presenter and organiser in front of the students. It is hard now to find students who are not interested in my lessons. They like me to use modern equipment to help with my teaching.

Interview Teacher A

This teacher appears enthusiastic not only about using ICT in the classroom but how it has changed the methodologies and the traditional teaching role of the teacher in China.

I like the teachers who always use ICT in their lessons. It makes the lessons more interesting. I like to ask questions now this has happened. It seems the behaviour of the students has become better than it was before ICT was used in the classroom.

Interview Student A

Not only did the previous teacher like the new role but this student is also taking a more active part in lessons and has positive views on ICT being used by teachers.

It was discussed by Guile (1998):

ICT may offer tremendous possibilities for helping to overcome underachievement, disaffection and social exclusion, yet in one sense they are not the key issue, since claims about the potential of ICT may lull teachers and education policy makers into viewing it as the magic ingredient.

(p. 24)

In essence, the teacher has become one of the students. More and more multimedia applications are being used for presentations, projects and in the production of the students' homework. It is accepted that ICT offers powerful approaches for teachers.

Some of my students are very good at using computers and are better at it than me. Occasionally they help me to sort out the problems that I am having difficulty with. I have to be a student; that is the benefit for both teachers and students.

Interview Teacher A

That some students are more adept at using ICT than teachers is fully accepted by this teacher and, instead of this being viewed as eroding class control, it is being used positively to the benefit of both the teacher and students.

Some of the teachers have willingly accepted the incorporation of the new pedagogy with ICT into their teaching; from her lesson observations the researcher is sure that the students like this sort of change. The following interviews showed that it is not only the students who like the change, but the teachers as well.

Every time I use a computer in my lessons it seems the students are more and more interested; it is a lot easier to get them to be quiet and actively involved in the lesson.

Interview Teacher B

.....the time I use the computer to access the Internet during the lessons, is the time I get great satisfaction from my work.

Interview Teacher C

Since I have been using ICT in my lessons I have been able to control the classes more easily and pleasantly; this has saved me a lot of time. The students have felt that their homework is no longer boring. When I ask them to do their homework and store it on a USB, it seems it is a very fresh approach and it becomes an exciting activity for them. They say to me that they hope we can get rid of all the paper work forever.

Interview Teacher E

From last year, more and more teachers have changed their usual way of teaching. Probably that is because the head encouraged them to do so, any way this is a great change for the classroom. Even though our study pressure is still the same; this is a good start.

Interview Student B

These are positive endorsements for the use of ICT in the classroom. The students appear to be actively engaged in their lessons and view the technology as an exciting development. The adoption of ICT into the pedagogy has given these teachers more quality teaching time in the classroom.

In one of the schools the researcher held a group interview; the group included teachers as well as some students. When being asked about what they thought about using ICT in the classroom, the children became very animated when trying to respond to the questions. They were all very excited about this new approach saying that it made the lessons much more interesting for them. Most of the teachers thought

that they would like to integrate ICT into their lesson plans as well as their general teaching methodologies. However, there were some different views expressed by teachers. Some disliked using a computer in the classroom; their criticism being that it was just a performance and that incorporating ICT into the curriculum was being done simply in order to comply with the Local Educational Bureau's direction and not because it had educational values.

Using a computer in the classroom is absolutely just a political statement. I cannot see any benefit from it. Opening and closing the Internet will take a lot of time; if the teacher is not very good at using computers it will make things worse and worse.

Interview Teacher H

Whatever the reason, the headteacher and other staff have had little success in persuading this teacher of the possible benefits of using ICT.

I like to use different sorts of teaching materials in my lessons. That makes the time pass quicker than usual.

Interview Teacher E

No, I am quite the opposite of teacher E. I do not want to waste even a couple of minutes in my lessons by using technical equipment. I believe what I have to say can still be interesting to the students. I am confident that I could win against the computer.

Interview Teacher D

It is disappointing that this teacher views ICT as a battle of teacher against machine and has not understood that ICT should be integrated into teaching and learning methodologies.

I wish that all the teachers would use computers or videos in their lessons. This is the best way for us to learn what we were taught during the lesson. The pictures and colourful images we can look at can have a big effect on our understanding of the problem.

Interview Student A

This is a very common and not unreasonable view expressed by the student. Nobody likes to have their lessons taught in the same way all the time. Introducing different sorts of materials into lessons can help to stimulate the students' enthusiasm of the subject and it can also help avoid the lesson being boring. The following student had a similar thought to student A. They both enjoy the new technical equipment being used in the classroom.

Yes, I think lessons with ICT are great. Teachers using videos and computers in our lessons have changed our lives. Being able to use a computer to finish our homework is very different for us. It has saved a lot of our time.

Interview Student B

The teachers' integration of ICT into their personal teaching methodologies was a requirement of the government. However, another reason is that they thought it would increase the students' enthusiasm for learning as well, which will help them make better progress with their studies. Of course it must not be forgotten that the administrators in schools encouraged and even demanded that teachers start to use ICT in their lessons. The situation now is that all new teachers must pass a computer training course before they are allowed to start teaching.

I am a geography teacher. The use of ICT has given me a lot of confidence and satisfaction with my work. I do not need to carry a lot of models and maps to the classroom like I used to have to all the time before. All my work is now saved onto a small disc; only occasionally

is it now necessary to take a model into the classroom to show to the students.

Interview Teacher C

I am an art teacher. The computer packages have helped me show my work to the students; how to compose and build up the pictures, how to use colour and how to appreciate art from films and videos and how to find good resources from the Internet. That stimulates the students' imagination and creativity.

Interview Teacher F

Before I started my teaching after leaving university, the Local Educational Bureau organised training course for all the new teachers. It was not very difficult for me to learn how to use the ICT facilities, the hard part was the pedagogy, how to develop the potential of using ICT in the classroom. I think that is a challenge for me and all the new staff.

Interview Teacher G

The teachers the researcher has met who teach geography are all very strongly of the opinion that they like to use computers in their lessons. Geography is not the main subject in schools in China. The entrance examinations do not include geography and so schools do not give as much time to the subject as to the core curriculum.

Compared with the other subject teachers, for example teachers of mathematics, Chinese and English, teachers of geography have more spare time in which they can develop their use of ICT in the classroom environment. The teachers of maths, physics and chemistry displayed more negative attitudes to using ICT in their lessons. Although most of the teachers of the natural science subjects have ICT skills they do not have time to use them in lessons because they have too much work to cover in preparing their students for the important examinations. Music teachers, much in the

same way as the geography teachers, made more use of ICT than the other core subjects.

One of the Chinese teachers interviewed had some comments to make about using ICT in school.

I teach Chinese and as you know written Chinese does not use a phonetic alphabet instead it has characters which are known as pictographs. These pictographs are made up of lines or strokes as we call them.

When the students learn new characters I have to use chalk to write the character on the board to show them the order of the strokes. The computer package is good but it can not replace my work from this point of the view.

Interview Teacher H

The computer software package has helped me draw diagrams for the students in my maths lessons. It is very good, but I do not use it to do too many things. The big focus is on the examinations.

Interview Teacher C

Again this is a situation where the time taken in preparing students for their examinations precludes incorporating ICT into teaching and learning methodologies. Changing established methods involves taking a risk with the examination results of students, and, in a climate where these are very important, this is not an action a teacher will willingly want to take.

In our English lessons we are used to the traditional ways of teaching. The only difference in using ICT is with the students' homework; this was saved in my USB and sent to the students. They returned the work in a same way as well. That is the only change.

Interview Teacher G

But there are some other views about the teachers using ICT.

Using computers in the classroom wastes our time. Most of the teachers just like to use things like PowerPoint, Excel etc, which are not very interesting. My computer skills are a lot better than the teachers. I do not think that the lessons are any more interesting at all when we use computers in the classroom.

Interview Student C

Teachers normally use Word processing, PowerPoint, Hyper studio and Internet searching in their lessons. These are all very basic applications of ICT and Word is appropriate for nearly every curriculum area. The Internet was not being used so often, which the researcher found to be rather surprising. According to the interviews, the teachers said that if they allowed the children to use the Internet it would be hard to control the class situation. The students said that that view was true:

...we'll definitely visit some other sites on the Internet that we are interested in.

This was argued by Wheeler (2001):

Change may bring uncertainty, but the introduction of ICT into the classroom brings one thing of which we can all be certain - teachers will need to adapt to change if they are to survive and keep pace with new methods and technologies.

(p. 1)

This research supported these views. Quite a lot of the teachers were worried about using ICT thinking that it would make it easier for the students to be distracted during the lessons rather than focussing on what the teacher was trying to teach to them. This would appear to be a problem of communication between the teacher and students; an

atmosphere where there is mutual trust and respect can render these misgivings meaningless. Teachers should have enough confidence to challenge their reliance on established traditional methods and be prepared to consider positively the new concepts of education that are a consequence of the introduction of ICT and accept that it will affect pedagogies. This was argued by Loveless, DeVoogd and Bohlin (2001).

Teachers are part of networked communities – human and virtual – and need to draw upon the experience, expertise and enthusiasm of colleagues in order to develop and share pedagogical practice.
(p. 70)

This was discussed by other authorities in chapter three (see Section 3.2). Using ICT in teaching and learning will require the teachers and the leaders to change their traditional approaches.

The McKinsey (1997) Report also makes this situation perfectly clear.

Only a minority of teachers are capable of managing ICT resources and organising the classroom to ensure that effective subject learning is taking place. Many teachers still have difficulty in deciding when, and when not, to use computers, while others are reluctant to use them at all. Teachers who have had experiences of faulty technology are often sceptical about the capacity of ICT to help raise standards
(p. 258)

From the researcher's interviews and lesson observations she found that not all of the teachers were full of enthusiasm about using computers in their work; this applied particularly to the female and some of the older staff. They showed a lack of

confidence in learning how to use ICT to support their teaching and many were heard to complain about the pressure of their jobs.

At my age it is not the right time to learn to use a computer. Years of marking work have made my eyes very bad. I am not a clever enough person to start to learn new things any more.

Interview Teacher J

This is a common feeling expressed by the middle aged teachers who were interviewed. The high pressure of teaching has given them a great deal of stress and schools are still focussed very much on the students' examination results. Good results mean a good name for the school, and it will smooth the path for the next year's recruitment of students; this is like many other countries in the world. Some of the teachers are still not convinced that the use of ICT is really better than their traditional way of teaching. The large size of the classes in China also makes incorporating ICT into their teaching even more difficult.

Our headteacher, no most of the headteachers from different schools, all give their teachers a lot of pressure in their work. They hope their examination results are better than those of the other schools. Students must have good behaviour during the lessons. It's hard for me to achieve all these things.

Interview Teacher C

This teacher is explaining the effects the examination system has on her pedagogy. It is difficult to achieve all that it asked of the teacher in terms of examination results and to use ICT as well.

Those teachers who are over the age of thirty will face very serious competition from the younger ones when trying to keep their jobs. Quite a lot of schools like to employ young graduate teachers rather than keep the older ones. This is because some of the Local Educational Bureaux have their own policy; that those teachers who are over forty years old can take early retirement with a full pension. When interviewed, one of the headteachers told the researcher.

We like to employ young people to work at the school. They are easy going. The children like young teachers, they think that they are fashionable and they like to organise some activities after lessons.

Interview Headteacher C

There is an implication that young teachers will accept new policies and initiatives with little argument whereas more established teachers might want to discuss the merits of change.

The older teachers understand that the children prefer younger faces in the classroom.

One of the teachers said

Some of the girls like young male teachers, and the boys like pretty and young female teachers. That's quite natural.

Interview Teacher H

One of the interviews was with a biology teacher who was over fifty years old. When the discussion turned to the use of ICT in the classroom he started to become very upset. This is a transcript of the interview.

Author: *“Do you use computers in your teaching?”*

Interview Teacher D: “No, I do not; I only use a computer at home.”

Author: “Why is that?”

Interview Teacher D: “Using ICT in the classroom wastes my teaching time. The examination results of my students would go down straight away and so I will lose my bonus at the end of term. The only reason I use a computer at home is that my daughter is studying abroad. We chat on the Internet. ”

Author: “Do you use the Internet to do some searching for material for your lessons?”

Interview Teacher D: “I just use the Internet on the computers at the school’s library to search for information. More than thirty years teaching experience has given me all the techniques I need for my teaching. I do not want to risk losing control of my lessons just because I let the students use Internet. They are children; it is hard to say how they will behave when they are on the Internet. ”

Although many reasons are given by this teacher for not using ICT, the first one to be mentioned is the importance of the students’ examination results and that these results determine how much is paid to teachers in their end of term bonuses. This system of rewards by results gives a serious focus to the efforts of teachers. Very clearly this biology teacher uses a computer just for his personal use. Even though he has some knowledge of ICT he refuses to consider any change in his teaching methodologies; this is a great shame.

Some of the staff still write their teaching plans by hand whereas others have started to use computer packages at a very basic level for this task. It appeared that use of ICT by teachers in the languages department was very limited. This was mentioned by a teacher who teaches Chinese. She said that most of the teachers who teach Chinese are the same as her. The only time they could possibly think about to using ICT was at the beginning of the term, definitely not near the end of the term when there are examinations.

I do very well in my teaching, why ask me to use ICT? It means it will take me several weeks of hard work to create a good package for the classroom.

Interview Teacher H

Once again the introduction of ICT into teaching methodologies is resisted because of the constraints of the time available and on the necessity of achieving good results for the students in their examinations.

I know that using ICT can help my teaching, but I will not use it at the end of the term. That is the time for us to help the students for the examinations.

Interview Teacher F

Teachers often said that, whenever they are having conversations whether in public or private and even at conference meetings, they always hear people making some complaints about using ICT in the classroom.

People like to say everybody is working for life. We have to use ICT in teaching so we could have our bonus.

Interview Teacher F

Payment of a bonus for using ICT in the classroom is incentive enough for this teacher.

From the analysis of the key points from the researcher's interviews with the teachers, there are four main contexts that have emerged for using computers. These are:

- 1) classroom practice
- 2) personal use

- 3) professional development
- 4) administration.

Teacher D, who teaches biology and part of whose interview has previously been quoted, has views on using a computer that belong to the second of these contexts. Even some of the new teachers have the same thoughts, but, since they do not want to take the risk of losing their jobs, they have to use ICT in their teaching. The headteacher can appreciate the efforts the teachers have made to incorporate ICT into their teaching when their teaching plans are checked and lesson observations take place. One of the English teachers said:

The reason I use ICT is that I just want to please the head. Most of the time I use PowerPoint; that is easy for me to learn and saves some of my time.

Interview Teacher E

The Local Educational Bureau has given headteachers the responsibility for employing teachers in their schools. The headteachers can now decide to terminate a teacher's employment and also decide that a teacher should take early retirement even if it is against that teacher's wishes.

But the aim, of personal access for teachers to computers, is to help them become familiar with the technology and, consequently, allow them to successfully integrate ICT into their teaching and learning plans and so make their work more effective and efficient. Here is the transcript of an interview with another teacher to illustrate the point.

To be honest, at the beginning when the school asked us to integrate ICT into the curriculum, I could not accept it. I did not think that this could be any better than the traditional educational methods. From my point of view, using ICT for my preparation and searching for information was all right, but it is not for the classroom. My computer skills were just good enough for searching and basic technical applications; I did not want to lose face in front of my students by getting things wrong. Once I tried to use the computer in class and asked the students to finish their homework on the disk. I found that it saved me a lot of time when I came to mark it. I used to carry a lot of students' work back home with me. After that, if I needed to, I just saved all the students' files into my laptop computer and marked it at school or occasionally at home. My subject is Chinese; there is a lot of writing work in my teaching. I saved all the written work in a USB before I started and now I can use it when I need to during my lessons. It is marvellous.

Interview Teacher A

The initial reaction of this teacher to using ICT was negative because of his expertise with traditional methods and worry about what the students would think if things went wrong. This was transformed when his first attempt at using ICT in a lesson was a success and this led to further development of the use of this technology.

Teacher A and Teacher D have completely different approaches to using ICT. Both of them have the basic skills in using a computer, but whereas teacher A was able to use his personal computing experience to integrate ICT into the curriculum, teacher D refused to countenance any such change to his established teaching methodologies.

Another teacher who was interviewed admitted to a lack of confidence in using ICT in the classroom. She is a tutor and teaches English to the final year in her school's senior section. She said:

I think using ICT in the classroom is a very good idea. But I am a person who is not good with technical equipment. I have learned a

little about how to use ICT and have had some training in it. I found some new software packages to use in my lessons, but when I came to actually use them in the classroom I always forgot how to manage them properly and I became confused. The time just passes and passes. The school is so big and the computer staff so busy it is hard to find them to ask for help. Some of the students in the class volunteered to help me, but I was worried that I could lose control. The other students started to talk and do some things they should not be doing while we were trying to solve the technical problems. I am not very confident about my ICT skills, so I have tried hard not to use ICT in my teaching. It is so much easier for me not to.

Interview Teacher K

Although many of the attitudes expressed here are unsurprisingly similar to those of teachers in the UK, these teachers are in China and the implications are interesting in that this changing role is very different from the traditional methods of teaching that are used in Chinese schools. The schools in the survey are located in large cities where there is more exposure to new technologies than in the countryside.

6.2.2 The changes to the students

Students are now beginning to take on the role of presenters during their lessons. In chapter two (see Section 2.1.12) it was mentioned that, in the traditional Chinese classroom, students were very quiet and they did not have any chance to talk with the teachers. The teachers tried very hard to prepare detailed lessons and leave a lot of homework for the students at the end. Every night the students used more and more of their spare time completing their homework. Even though the students and their parents all appealed to the schools to lessen the amount of homework that was being given to the children the same things still continued to happen throughout the schools.

I wish our teachers would use computers as much as they can in their teaching. The relationship between us has changed a lot; when the

teacher asks us to show our homework or replace him or her as a teacher we can now stand in front of the classroom.

Interview Student D

I am very shy, especially in school. I am not good at studying, but the computer is my strong point. Teachers always ask me to help when they have technical problems, sometimes during the lessons, sometimes after class. They call me a genius. It gives me loads of confidence.

Interview Student G

However, the introduction of ICT into their lessons has seen a reduction in both the teachers' lesson preparations and the amount of paper work done by the students; a positive gain by all involved.

I really like our maths lessons now because the teacher uses a computer to teach us; this was particularly so when we started to learn solid geometry. That is a very difficult part of the book, but our teacher used a computer to show us how to work it out. This made it much better from the very beginning; it is so clear and easy for us to understand now, compared to when teacher the just used chalk on the board to help us work it out. It is a great change.

Interview Student A

6.2.3 The change of the relationships between teachers and students

...basically I am a trouble maker in the classroom. Because the teachers always talk and talk it seems it is difficult for them to find out what we really need. If the teachers can use a new and different way, such as letting us search for something from the Internet or creating things by ourselves it will be much more interesting.

Interview Student E

ICT supports different styles of teaching, this is irrespective of whether the teachers are very popular or not and of what methods they use in their lessons. A teacher

positioned at the front of the class and talking to the students the whole time is not welcomed much by them. Here are some interviews to emphasis this point.

The teachers who can use modern equipment in their teaching are good teachers. They understand this is the best way to make the students interested. Just talking all the way through the lesson is boring.

Interview Student B

I will concentrate very hard to follow my teacher in the lessons when we can use computers ...

Interview Student E

6.2.4 The change in the administration of the schools

Using ICT in schools can improve the efficiency of the management of the school. The rapid progress of the use of ICT in the curriculum has also made a great impact on the administration of the school. All the staff involved in administration have been given the chance to rethink their management roles. This not only encompasses the teaching and learning principles on which the school is based and the detailed direction of the students' studies but it includes the financial aspects as well.

The change brought about by using ICT in schools was so quick in China; it has happened in just the past ten years. Everybody has had to follow the developments in information technology. Our school's personnel department and teaching and learning sections are using ICT techniques to help to collate all the data of staff and students to help us make more informed decisions and set the examination papers. We can now accurately analyse the students' examination results; this also applies to the staff's teaching performances on which their bonuses are based. From feedback from all kinds of sources we can assess and rearrange the organisation of our work.

Interview Headteacher A

The researcher recalls that, ten years ago, the teachers and tutors in her school were extremely busy writing the students' ID information and the results for all the subjects at the start and end of the term. Writing the students' reports at the end of the term was another time consuming task for the tutors especially when usually there were fifty or sixty students in each class. They had to write all these reports by hand to give to the parents. Since the computer software packages were introduced into the management systems of the schools the situation has improved.

I don't know who invented the computer. I want to say thank you for helping me to get out from hell. I am a secretary, and my work is always about calculating the students' results, rank of the class, rank of the grades, rank of the teachers and rank of our school in our district etc. Oh, results, results...

Interview Staff L

One of the Local Education Bureau's secretaries, who used to work in the researcher's school, had similar comments to make to her as well; her work in the Local Educational Bureau is similar to the work Staff L does in her school.

The teachers and the headteachers use computer packages for their work. For example, the spreadsheet helps them analyse information contained in the databases. I interviewed another headteacher, he said:

We use spreadsheets to work out the rank; that has really reduced the workload a lot. When I worked as a secretary fifteen years ago, a small calculator was the only thing I had to help me calculate the total score, the average of the students' marks and the staff's ranking in our school and in our district and in the city. I worked very late into the night at the end of every term. The times have changed; now I just input the data and the computer package will analyse it and tell me everything I want to know.

Interview Headteacher B

6.3 Lesson observations

Three of the four schools have digital multimedia network teaching systems. Using ICT in their teaching is easier than it was ten years ago. In those days, many teachers carried videos and slide show equipment to the classroom when they needed them, several teachers mentioned this, but now, using the remote controller in the classroom to use these new systems, they can do almost anything they want at the touch of a button. The teacher really had become a presenter (see Section 6.2.1).

School D has applied for more ICT equipment every year for the last five years. The Local Education Bureau has promised that it would give them the all the facilities they asked for early in 2007; hopefully they can realise their dream. Their dream actually became reality at the end of 2006 (see Section 6.1.5).

The geography lesson that was observed really impressed the researcher. The lesson was about Japan. At the beginning, the introduction gave details about the country's size, population, weather, economics etc. The teacher had prepared, from searching the Internet, a lot of pictures to display with the computer for the students to see. The teacher asked the students many questions such as: where is the capital city in Japan; where is the place that always has earthquakes in Japan; where is the place that had a tsunami recently and could you find another country that has suffered from a tsunami before? Why is this kind of event called a tsunami? The questions stimulated the enthusiasm of the students. After they had used the Internet to find the information they needed and had completed the work the teacher had set them they were so cheerful and excited. It seemed they were already looking forward to the next

geography lesson. Comparing the students' facial expressions to those of students in lessons not using ICT; it was so different.

When our teacher used Google Earth in our geography lesson or other materials in the classroom, we were so impressed.

Interview Student H

When a student from School D was interviewed he said their geography teacher never used Google Earth in their lessons. When he heard about other schools using different sorts of software package in their teachings, he looked very sad.

There was another thing that took the researcher's attention when she visited the schools. Sometimes the students looked very tired, even in the morning. One of the students said

If we want to have good results, we have to do lots of extra work at night. The time we have for sleeping is very short.

Interview Student J

I slept very late last night. If the teacher's teaching is very good, I could stay awake and be interested. Or, if the teacher shows us some good videos or Internet searching work, that would be different.

Interview Student K

It is apparent that the culture of education in China, where the focus is on the examinations, not only puts pressure on the teachers, as reported in Section 6.2.1, but the students also are under pressure to perform well in them.

The students were hoping that the teachers would incorporate ICT into the lessons not just talk throughout. However, they said this without any expectation but with just a rather resigned look on their faces as though knowing it would not happen.

6.4 Problems with the use of ICT

The technical support provided in the Chinese schools is not like that experienced by teachers in the UK; the four schools in the survey have no professional technician at all. The computer teachers have to take on the role of a technician or a network manager to help the teaching staff set up all the equipment such as interactive whiteboards, videos and computers. This is in addition to their normal teaching load.

The second problem is that, in three of the schools, the computer suites are always overbooked and teachers cannot take a class to use one when they want to. This situation certainly delays the integration of ICT into teaching and learning. Many teachers were able to book a computer suite, but there is never enough capacity to satisfy the demand of all the teachers.

Our school has three computer suites. It looks enough, but I can only use one every three weeks. Each of the classrooms has one computer; but I really want the students to be able to search for information from the Internet individually.

Interview Teacher F

In School D, the poorly equipped school, the teachers tried to avoid using the computer suite completely. They have used the room before but the poor standard of the software and equipment caused a lot of trouble.

I never expect to have a good experience when using a computer in my teaching in our school. The computers we have are very old and it seems nobody is bothered about it.

Interview Teacher D

Curiously, the computer suite still seems to be fully booked. One of the young teachers interviewed said:

I do not like to use our school's computer suite. But I have to book it, because if I never use computers to teach it will affect my score in my annual appraisal as a teacher. In the end I will lose money if I do not use a computer because a low score means low money.

Interview Teacher E

The record of teachers use the computer suite will be one of the evaluations for the teachers; this will affect their end of term bonuses.

6.5 Examination focus

There is a great emphasis in China on the examinations the students take when they graduate from one tier of their education to the next. This happens regularly when they move from primary to middle school, middle to high school and finally move on to university or some other form of further education. The consequence is that most teachers pay more attention to teaching for the examinations themselves rather than teaching as an educational process (see Section 6.2.1). The educational system of the England is a good example for China; there a school is evaluated not only by the test and examination results of its students, but also the improvement, sometimes referred to as 'value added', in the students' studies. In England, from the very first day the student starts at the school, it is common for the school to set up a database to

evaluate the student's progress. This database is continuously kept up to date and can be referred to at any time while the student is at the school and can move with the student to the next school attended.

The pressure in China to perform well in examinations has an effect on children during the school holidays.

I do not like school holidays. These are the worst times of the year. The school will organise even more extra lessons for us in the holidays. That means I will be studying harder than during term time.

Interview Student D

This is in contrast to the situation in England where school holidays are 'normally' used for relaxation. It is possible that a time away from study could help students focus better when they return to school.

In China, there is a big difference in ability between the students attending the key schools and those going to the other schools; this also has a knock-on effect on the quality of the teachers and the equipment provided in these schools. As is to be expected, the examination results of the students at the key schools are vastly better than those at the others. As a teacher at School D said:

We lost everything at the very beginning. We entertain no high hopes in this regard.

China is a huge country, and the development in schools varies enormously in different regions. Some schools have several luxury computer suites whilst other

schools, particularly in the countryside, struggle to provide adequate supplies of basic materials such as chalk to use in the lessons.

6.6 Internet

6.6.1 Use of the Internet in schools

Some of the schools in China are successfully using cable networks, installed for cable TV and telephones, as fast Internet connections.

Some of the factors that enabled school A to reach a high standard in using the Internet in its teaching programmes were its ICT equipment and the commitment of the management to encourage the teachers to use it effectively.

Forsyth (2001) argued about the way of using the Internet at school is as a delivery and interactive tool.

The technology and the methodology to use the Internet as a tool for delivery of learning materials, or in a generic sense 'online learning', are evolving.

(p. 5)

The headteacher of School A is very proud of this.

Our school could be one of the top few schools in our city to reach the very highest level of using the Internet as a tool or as an interactive medium in our teaching and learning.

Sadly, School C's situation is not so promising. Using the Internet to have an online learning experience or to use it as an interactive tool is impossible.

We never have thoughts about using the Internet in our teaching and learning. Maybe after five years it will come to be true, but not now.
Interview Teacher K

In the course of the researcher's interviews with the students they discussed the issue of using the Internet in teaching and learning. The students said they liked the idea of using the Internet interactively and using the Internet as a tool to do some searching in the lessons, but some of them worried that that would have an effect on the way their teachers guided them when revising their work; that could damage their results.

Using the Internet in our lessons has really changed the style of teaching and learning. The teachers are not as serious as they used to be. They have become our friends a little bit more; because they could get into difficulties while using the computer they know that some of the students can help them.
Interview Student J

I like to use the Internet at home rather than at school. There I can use it for as long as I want. Using the Internet at school is different. So many students packed into one classroom, just focussing on a computer; that will waste time. I prefer to be by myself.
Interview Student K

I hope the teachers do not use the Internet in their teaching when we prepare for the examinations.
Interview Student L

Satellite networking is likely to be a growth area in the future as it is not dependent on phone lines and physical connections. Both the teachers and the students in School A are pleased with their school's facilities.

Our school's technical equipment is what we expected. It is all very new and with the latest technology.

Interview Student K

It is easy to find modern teaching equipment in our school.

Interview Student M

Our headteacher is one of the only few heads in our city who like to spend money on ICT equipment.

Interview Teacher B

The Internet offers a wealth of information and resources for teachers. They can use the Internet to search for the information they want, when they need it. It has reduced teachers' workloads and given them easy access to high quality materials.

I am a history teacher. Internet searching has changed my work from just relying on the text book to real life. Accessing the website to an interactive whiteboard has made my teaching so colourful and interesting. I can now create my own resources; spreadsheets, graphics, software and Internet images, etc.

Interview Teacher E

6.6.2 Less Internet access

Except for School A, all of the other three schools have fewer Internet connections than they really need; the staff and the students are very frustrated with this situation.

They are unable to access the Internet at anytime that they wish to. They have to go to

one of the few computers that can connect to the internet and use that if it is available; this is not always convenient.

I suggested to our headteacher that we needed to have broadband for school. But he said the cost would be too big for this to happen.

Interview Teacher H

The students have the same thoughts as the teachers.

Because our school is poor, we cannot expect that good use of the Internet could happen here. But maybe soon.

Interview Student G

Only two of the four schools surveyed have a broadband connection. The other two struggle with the slow speed of dial-up Internet connections. This situation definitely causes an abundance of problems for the staff who want to use ICT in their teaching.

The head keeps saying that we should use ICT as much as we can in our teaching. But the school has only given us a small number of computer software packages. If we need more, we have to find them from the Internet or somewhere else.

Interview Teacher D

6.6.3 Home and school links

Parents always hope to have as close a contact with schools as possible. Now, three of the four schools which took part in the survey have set up a campus network. Every morning when the students arrive at school they must use their ID cards to pass through the school's entrance. The school's network contains all the records of every student. Using a pin number or password, to ensure the security of personal

information, parents can keep a check on their children's records. They can see what time they arrived at school, if there are any commendations or complaints from the teachers, what activities are happening, what the examination results are and other information of interest.

All the students in our school have an ID card. That is very useful. We use this card to pass the school's gate, borrow books from the library, buy some snacks from the school's shop and phone our parents through the school's phone box if something happens.

Interview Student C

The parents are very happy about the school's ID card system. It saves loads of time and it is very useful for the children when they are buying things inside the campus.

Interview Teacher B

After I had an ID card I thought I had grown up. When I use the card in the library it makes me feel as if I am a university student and I am really happy about it.

Interview Student H

Email is increasingly becoming a channel for sending multimedia materials as attachments in communications with interested parties. In addition, email has become a valuable tool for allowing pupils with disabilities to communicate with the widest possible range of peers as well as allowing international communication between pupils to easily take place. Recently, more and more students have set up their own blogs on the Internet; in some ways this has given them a very personal experience in using the computer.

Using email has become very common now. Quite a lot of the students and the teachers, particularly the young staff, have their own blogs. It is very interesting.

Interview Teacher G

6.7 The government's financial support to the schools

The four schools all claim they need more financial support. Schools A, B and C are quite lucky because they have strong support from the government as well as from the parents. School D is the weakest of all four schools in all aspects.

Our school has had good support from the Local Educational Bureau as well as extra funding from different sources, like our parents.

Interview Headteacher A

For School D, it is impossible to find any extra funding from other sources. The only place it could seek help from is the Local Educational Bureau; however, the waiting list was too long for finance to be readily available. There are many other schools in the same situation as School D. Another reason for School D being in this position is that over the past ten years there has been a frequent change of its headteacher. If the government considers the headteacher is not the right person to hold that position in the school, then it will have no hesitation in moving that person out and appointing a new one. These unexpected changes have made the school staff feel vulnerable and lacking in direction and so its situation has deteriorated. If the government had promised to give one headteacher some money for a particular initiative in the school, that allocation will disappear if a new head is appointed and so the long process of applying for more finance must start again.

Nearly every three or four years we had a change of headteacher. Each new head brought new ideas. Some liked ICT and some did not like technical projects. What can we do? The best way is to keep the traditional ways of teaching that I am familiar with and keep the results of my students as high as I can. I must make sure I have done my work as well as I can.

Interview Teacher D

Our school never got close with the Government. The Government always puts the money into the key schools. The old versions of the computer, that we have, never work properly.

Interview Teacher K

Differences in the financial backgrounds of the students' families have a direct influence on the computer skills of the students. Some of the students' parents who have a good income and have been well educated have a family computer or laptop or both. So, before they were even in the primary schools, some of the students had already the advantage of being able to use a computer as part of their lives. Unfortunately, at the other end of the scale some of the students have no computer at home.

I have used a computer for about ten years. My father is a businessman; he always works in another city or abroad. We contact each other by email with the computer.

Interview Student F

The key schools have always received regular financial support from the government, but, even though they keep applying, the other schools receive little by the way of extra finance. This situation has yet to change. But there are rumours that suggest that the government is considering a plan to address this problem of finance. There is a

thought that some of the poor schools should be amalgamated with other more successful schools. If that were to happen it could help schools like School C.

Some of the students' parents give a lot funding, in one way or another, in order to obtain a place for their children at one of the key schools.

In our school, in every grade, there are two or three students in each class whose parents have paid a few thousand Chinese Yuan, or more, to get their children in.

Interview Student G

In one of the schools visited, the computers are still running Windows 98 and the only place where the Internet could be accessed was on the computer in the headteacher's office. In talking about this, the staff were very frustrated about the poor situation they are in and how badly the school has been treated. They thought that the Local Educational Bureau had made mistakes from the very beginning. The effective use of ICT in the curriculum was clearly impossible for them. The only computer suite on the campus was always locked, and its use seems to be one of decoration to show to visitors to the school; it is under exploited as a teaching resource.

6.8 Summary

This chapter has been concerned with the analysis of the qualitative data collected in the course of the research. The methods of data collection employed were interviews, group interviews and lesson observations, with all the interviews being of the semi-structured type.

The method of analysis was that of identifying key strands in the interview data and focussing the analysis along those strands. If it was thought necessary, the strands themselves could be subdivided. In its formative stage the analyses of the teachers' data and the students' data were kept separate, this was not possible in one of the group interviews which had both teachers and students together. Since these analyses used the same basic key strands it was relatively straightforward to eventually combine them together. It was in this combination that the different perceptions were compared and contrasted with each other.

The points raised in the interview process have been recorded as quotations from the dialogues between the researcher and the interviewees.

This chapter has analysed the opinions of those involved in the interview process along with the evolving themes of the discussions. This has added the dimension of depth of opinion to the analysis of the quantitative data in the previous chapter.

The following chapter is an interpretation and discussion of the analyses of the quantitative and qualitative data for the teachers and another for the data of the students. These will include areas of success as well as barriers to the successful integration of ICT into the teaching methodologies of middle schools in cities in China. The aims of the research study will be the focus for the interpretation.

Chapter Seven

Interpretation and Discussion

7.1 Introduction

This chapter is divided into two sections. The first part gives the interpretation and discussion from the quantitative and qualitative analyses of the survey of teachers. It will include the problems of the teachers in using ICT. The second part gives the interpretation and discussion from the quantitative and qualitative analyses of the survey of the students. This will include a discussion of the problems facing the students in their use of ICT in learning.

7.2 Interpretation and discussion from the quantitative and qualitative analyses of the survey of teachers

7.2.1 Gender and age of the teachers of the survey

The majority of the teachers in the survey were female with the proportion of female teachers who responded to the questionnaires being slightly more than eighty percent (see Table 5.1). This can be seen to be representative of the whole staff of the four schools represented in the survey and hence the findings from those taking part in the survey can reasonably be extrapolated to the views of teachers in urban schools throughout northern China. The cross tabulation in chapter four (see Table 5.23) that

analysed the distribution of female and male teachers, who responded to the teachers' questionnaire, in all the age groups shows a pleasing spread. This gives confidence that the teachers are not only representative, in terms of gender and age, of staff in the four schools in the survey but of staff generally in middle schools in Chinese cities.

Nearly half of the respondents were under thirty years old with more than eighty-three percent of the respondents being under forty years old (see Table 5.2). Detailed analysis (see Table 5.24) shows that there is a good range of teaching experience across all the age groups and genders in the sample. Chinese and mathematics are two very important subjects in China. The schools' timetables indicate that students have daily lessons in these two subjects in nearly all schools throughout China. The results of examinations in these two subjects could decide the students' whole lives. The results of the entrance examination of high schools and the universities mainly come from these two subjects (see Table 5.3).

The Chinese government's new policy is to encourage teachers who are over forty years old, or who are not in very good health, to apply for early retirement along with an entitlement to receive a full pension. Only 16% of the teachers in the survey have more than fifteen years teaching experience (see Table 5.4). This new policy has aroused a great deal of criticism, but it seems it is still being followed.

7.2.2 Teachers' use of ICT in their teaching and learning methodologies

One hundred percent of the teachers from the survey said they are using ICT, regularly or sometimes, in their teaching (see Table 5.5), but this does not mean that they actually like to use it in their work. That teachers in China are likely to follow the

government's directions is shown by Table 5.25; with well over 80% of teachers in each age group, except for the 40 to 50 years old age group, using a computer regularly in their teaching. From the interviews conducted by the researcher, some of the teachers said they use ICT because they are required to do so by the school and the Local Educational Bureau. They also stress that there are additional financial benefits to them if they do.

ICT was purposefully introduced into schools in China from 1997 when, under the encouragement of the government and the schools, teachers began to use ICT in their work. It is pleasing to see that already 45% of teachers have been using ICT for more than four years (see Table 5.6). The proportion of the number of years teachers have been using computers increases with age; with 29% of the under 30 years old age group having used them for more than 4 years compared with 80% for the over 40 years old teachers (see Table 5.26). The more experienced teachers have been using computers for longer than the young teachers even though it is widely thought that young people are more confident with using ICT than the older ones, particularly when it is new technology.

In chapter two (see Section 2.2.6) it was mentioned that the Ministry of Education decided in 1997 to set up a thousand experimental schools in which to introduce modern educational technology. Again in 2003, another one thousand schools were selected from 600 thousand primary and middle schools in China to introduce modern educational technology, to improve the overall quality of education in schools and to search for more effective teaching methods.

The “Primary and Middle Schools Teachers Technical Ability Standard” was published in 2003. The Standard proposes that all the teachers in Primary and Middle schools in China must have at least 50 hours training in ICT in order to promote the development of the use of ICT in schools. This was referred to in chapter two.

The enthusiasm that many of the teachers have for using ICT in their classrooms is spreading to others who were not convinced initially. It will probably alter the traditional Chinese way of teaching in which the teacher is the focus of the lesson; instead there will be increasingly more communication between the teachers and the students because of the use of modern ICT equipment. However, China could become the same as some other countries, where the initial enthusiasm of both teachers and the students at using ICT, later started to fade. It appears that it is difficult to sustain progress and find further developments to integrate ICT into the curriculum. In the past ten years China has achieved much in this area but the problem of how to sustain this development over the ensuing decades will be a demanding test for everyone concerned with education.

Clearly, a series of new policies devised by the government show its determination to continue the development of the use of ICT in schools and the two times a thousand selected schools’ ICT teaching and learning project made the use of ICT in schools come closer and more quickly than was expected.

Somewhat surprisingly, 13% of the teachers in the survey said that they have experience of using computers but they do not regularly use ICT in the classroom (see Table 5.27).

The responses to the questionnaire show that all the teachers said that ICT helps them with their teaching (see Table 5.7). This result is very different from the feelings expressed during their interviews. One of the biology teachers denied all the benefits of using ICT in teaching and learning.

It seems that the teachers' motivation for using ICT and their knowledge of ICT are two different things. The interviews show a better picture of what the teachers actually think about ICT. Some of them really do like to learn how to use it in their work; however, some of them disagree with using ICT and think it does not have any advantages over their established methods of teaching and learning.

Teacher A is an optimistic teacher who is enthusiastic about integrating ICT into his teaching and learning. During the interview he kept saying how ICT could help the school's work and what a bright future it would be with it as well. He does not mind that his students might have better computer skills than he has and he has enthusiastically accepted the incorporation of the new pedagogy with ICT into his teaching.

Teacher E quite liked the change to the new teaching styles using ICT in the classroom and keeping homework on a small USB. Teachers B and C said they were also enjoying using ICT in the classroom and using the Internet to search for information to support their teaching.

Irrespective of these differing opinions from teachers about ICT in the curriculum it is important to remember that effective use of ICT can itself be established and improved upon as the scope of the technology advances.

However, Teacher H denied all the possible advantages of using ICT in the classroom. He thought that using ICT in the curriculum was just following the government's directions and that it does not help teaching and learning at all.

When interviewed, Teacher F was focussing on her income. She said that if she refused to use ICT in her teaching it would affect her bonus. Using ICT in teaching is part of the evaluation of their work that teachers are assessed on. The result of this appraisal could directly affect their end of term bonus. So this is one of the reasons why one of the English teachers the researcher interviewed said a lot of teachers use Word to type into PowerPoint as a simple way of integrating ICT into the curriculum. This is simply to comply with the school's requirements and achieve the aim of using ICT in their work.

Over half of the teachers, in responding to the questionnaire, said that they knew what ICT meant. It is the researcher's opinion from her interviews and other conversations with teachers that this does not fully show the true picture of the teachers' understanding of ICT with the likelihood of many more not having a proper grasp of it (see Table 5.9).

Using ICT in the classroom is one of the elements of the appraisal scheme for all teachers. Most of the teachers at interview said they did not know too much about ICT

and they just used the easy packages in their teaching. One of the English teachers stored all the homework tasks in a word file instead of using chalk on the blackboard. All the teachers from the researcher's survey responding to the questionnaire said that they liked to use ICT in their work (see Table 5.12) but this result must be treated with caution as a result of the interviews commented upon above.

To transform teaching methods from the traditional to ones incorporating ICT was very difficult at the beginning. Teacher A is one who really likes to use ICT in the curriculum. He was very unsure and worried at the start about using ICT in teaching, but found he achieved a lot from it. The confidence he gained by using ICT has made him into an optimistic teacher.

Internet searching has become more and more popular. The computers in three of the four schools in the survey can access the Internet and that has helped the teachers in those schools to change their traditional way of teaching. But the teachers of the main subjects, mathematics and Chinese, are reluctant to let their students use the Internet to do the searching and most do not use the Internet themselves either. Teachers of history, geography, music and art are using Internet searching machines more than teachers of the other subjects.

From the interviews it was apparent that many teachers were very enthusiastic about using interactive whiteboards. They considered that using this technology would gain their students' attention, making the teaching and learning experiences very effective and interesting. Those already using them reported that class organisation was completely changed by this technology. These comments imply that the present

proportion of 20%, which must be regarded as a success since the technology has only recently been introduced into Chinese schools, of teachers using interactive whiteboards (see Table 5.20), will increase rapidly.

The integration of ICT into the curriculum is not the sole responsibility of the teachers; management has a significant role to play. Kendall (2003) (see Section 3.3.1) suggests that, in England, effective school leaders are essential to realising productive teaching environments in the schools. It is likely that this is true in China as well.

The integration of interactive whiteboards into the curriculum has made the use of ICT in teaching and learning move up to another level. Obviously the interactive whiteboard can make the teachers' work clear and colourful, compared with using coloured chalk on the blackboard, and it can be linked to the Internet at any time it is needed. Use of the interactive whiteboard can make the learning processes for the students more interesting and dynamic. Compared with using computer animations, videos and tape recorders, that were in themselves new a few years ago, the presentation of lessons has developed enormously. Both Student A and Teacher A (see Section 6.2.1) commented about the positive changes made in teaching and learning by interactive whiteboards.

Hopefully the enthusiasm the students and teachers have for using interactive whiteboards in the classroom will last for a long time. It would be interesting to conduct the interviews again, in a few years time, to see if their attitudes to the use of

this technology have changed. However, the pace of development of ICT in education is unrelenting and it is likely that new applications will emerge in the near future.

It is significant that, when analysing the gender differences of teachers using interactive whiteboards in their lessons (see Table 5.33), only female teachers use them and that they are spread across all the age groups. In recent years many foreign companies have come into China to promote their products, including interactive whiteboards, and the Chinese Universities have joined in this market as well. All of them think that the large Chinese market is full of potential; this competition will undoubtedly help the spread of ICT throughout China.

The experience of teachers using interactive whiteboards in schools in the UK, where they are now quite prevalent, could be a guide to their future use in China. A study in England by Levy (2002) (see Section 3.3.3) concluded that interactive whiteboards were being used in creative ways that were compatible with the educational aims of the teachers. It pointed out that teachers needed opportunities to explore broader pedagogical issues from the start. This emphasis on the pedagogy of using interactive whiteboards was also featured in a report on the same topic by Davidson and Pratt (2003) (see Section 3.3.3) who suggested that they had potential to enhance motivation and conceptual learning.

7.2.3 Problems for teachers in using ICT

7.2.3.1 Training and guidance

Training in the use of ICT is shown to be available for 94% of the teachers in the four schools (see Table 5.18). Newly qualified teachers have a short training course in ICT before they take up their first teaching post. The other teachers had some in-service training in ICT around the year 2000; the time which the Local Educational Bureau started to set up the ICT in teaching and learning in the classroom project. There are few in-service training courses focussing on the continued use of ICT throughout the curriculum available for teachers who have already qualified and in teaching posts.

The problem was highlighted by Zhang (2004) (see Section 3.2.2) who said there was an imperative need to provide teachers with ongoing support. It was also suggested by Crichton et al (2006) (see Section 3.2.2) that some of the existing teacher training is focussed on gaining a certificate rather than classroom skills in ICT. There is a similar situation in the UK where Jones (2004) (see Section 3.3.1) found that the confidence of teachers in using ICT was influenced directly by the amount and quality of training available. Even though extra funds have been provided by the government of the UK for this purpose the quality of training for teachers is still too variable to engender confidence.

The provision of effective in-service training for teachers, focussing on the use of ICT in the curriculum, is also a potential problem in other countries. In a study of schools in Canada, Granger *et al* (2002) (see Section 3.4.1) recommended that significant opportunities for teacher education in ICT are as necessary as the latest equipment. It

would appear that the recommendations regarding the need for effective teacher training for the integration of ICT into the curriculum of schools are very similar in the many countries that have taken this initiative. There is a wealth of educational research available for the educational leaders in China who have a focus on the use of ICT in schools.

Three of the schools in the survey have an Internet library, but they need some professional Chinese websites to add to their resources which are lacking in this respect. The store of useful databases they hold is severely limited. Beginning in 2001, some of the big cities started to build up digital libraries to provide a wide range of resources for institutions and citizens. But if the school's Internet facilities cannot access this at any time (as happens in School D) then the students cannot use it effectively while at school; even if they have home access to the Internet their heavy homework commitment makes that type of work impossible.

Through visits to the schools' libraries it was apparent they were full of books specifically to aid studies of the school curriculum. It was hard to find any books on how to use ICT in teaching and learning. If the teachers do not have enough material and resources to support them in their development of ICT, it is very difficult for them to improve their technical skills.

Lack of guidance can often stem from the inadequate appreciation of the situation by senior staff in the school. This was anticipated by Scrimshaw (2004) (see Section 3.3.1) who proposed that one of the factors that was necessary for the successful integration of ICT into the curriculum of schools in England was wholehearted

support and vision for ICT from senior management. This would appear to be just as necessary in the schools in China.

In School A it was very difficult to find some students and teachers who were friendly toward each other, it all seemed very serious. During the break times between the lessons, which last only about ten minutes, teachers rushed to their offices to have a drink of tea or water and then dashed back to the classroom; the students were doing exactly the same.

School D is not ranked as high as school A, but it was still very rare to see the teachers and the students have a friendly talk together. Just occasionally the teacher's assistant, who is a student in the class, when giving the students' homework to their teachers managed to engage them in a short conversation.

7.2.3.2 Lack of support and resources

80% of the teachers said that they would ask their colleagues for help when they need to solve their computer problems (see Table 5.14). Detailed analysis (see Table 5.29) shows that 67% of male teachers would go and ask a computer teacher or another colleague to help them solve computer problems while 84% of female teachers would do. Within these proportions 75% of the male teachers consult a specialist computer teacher but only 38% of female teachers do. In the middle schools in China, most of the tutors are female teachers; they are in charge of classes comprising of a large number of pupils, usually between 50 and 60. The heavy work load involved in this task is the main reason preventing them spending time looking for a computer teacher

for advice and help. The campuses of schools in China are always very big and that is another reason to stop them looking for more help.

Teacher K is not very confident about using ICT in her teaching. She said to the researcher that she always felt helpless when she encountered technical problems and that was why she tried to avoid using it.

The four schools all have computer suites and, when the researcher saw them, apart from School D, the computer suites were always fully booked. When interviewed, Teacher F complained to the researcher about this. She said that giving the students opportunities to search the Internet individually would achieve much more than just using the one computer in the classroom. The students should have more chance to practice for themselves.

Even when the computer suites are all fully booked it does not mean they are actually being used for teaching all the time. One reason for this is the directives that come from the government. Teacher E said the teachers do not want to lose money and the record of how often they use the computer suite is part of the evaluation of the teachers and this will be linked with their bonus at the end of the term. The result is that some of the teachers book the computer suite but have little intention of using it.

A lot of schools are very slow in upgrading their technical equipment. For example, accessing the Internet at School D is very slow and the only computer that can be used to do this is located in the headteacher's office. The school does not have a broadband connection which would improve the situation.

School D is the poor school in the survey. It does not have a campus network (see Table 5.11). The only computer suite it has can just accommodate one computer lesson. Pre-booking a computer suite for a lesson ensures that the all students can each use a computer and not have to share. However, if the class has over sixty students, and some will have, a few of the students will have to share a computer during their lessons. The Government has looked towards introducing ICT into the schools' curriculum and it is willing to support them with the necessary finance. The responses to the question about using the computer suite was impressive in that more than 64% of the teachers said that their computer suite was always available (see Table 5.21). But the fact is that towards the end of the term nobody booked the computer suites at all; the examinations are at the top of everyone's agenda at this time in the schools' year.

The research shows that in all of the four schools in the survey there is a computer in it every classroom (see Table 5.22). In three of the schools the classroom computers can be used to access the Internet whereas in the other one it is just for a specific software application or a PowerPoint presentation.

The survey revealed that 16% of the teachers did not own a computer (see Table 5.19); this is a disappointingly large number. However, by the time this research project was nearing completion, the researcher was told that two of the schools in the survey were planning to offer a free laptop to every one of the teachers in the schools; that is excellent news for both the teachers and the students.

7.2.4 Internet for teachers

7.2.4.1 Internet used as a resource

The Internet offers many new opportunities for the teachers. It has the capacity to save their time when compared with the traditional paper workload. The Internet also gives teachers a chance to expand their ideas and introduce more information and resources into their teaching and learning methodologies. The Internet has the capacity to make the teaching and learning experiences for the students in the classroom livelier and more relaxed.

Before the integration of ICT into education, the middle school teachers in China used to rely heavily on Chinese curriculum reference books and encyclopaedias. At the beginning of the term the schools would give every teacher the appropriate text books as well as curriculum reference books. They still do this, but many of the teachers now prefer to ignore the reference books and instead they resort to the Internet to find fresh materials and information.

Eighty percent of the teachers access the Internet either at home or at a friends' house. A lot of young teachers share a flat or house with their friends, and the married staff usually have Internet access at home. Compared with the students, the adults prefer not to go to Internet cafés; with only 7% of teachers using them (see Table 5.10). Female teachers, at 40%, use the Internet at home more than the male teachers, of whom 33% do. The proportion of male teachers using the Internet at their friends' house, 67%, is almost double that of female teachers, 36% (see Table 5.28).

Except for school D, the other three schools are very good at being able to provide access to the Internet (see Table 5.13). The Government has some very good plans to encourage the schools to use ICT in their teaching and learning programmes.

When interviewed, most of the teachers admitted to not have strong Internet searching skills or enough experience to give them confidence when navigating their way through websites. There is a lack of tutorial material for the teachers to use to improve their own competences. The only way for them is to learn from their past experiences.

The use of the Internet to search for information has reduced some of the teachers' lesson preparation; it has replaced some of the investigations teachers do in the library and by using a dictionary. The history Teacher E has gained a lot from using the Internet to help her teaching and looks to this as a great achievement.

7.2.4.2 Internet used for communication

Research in England by Terrell and Capper (2003) (see Section 3.3.2) would suggest that the use of ICT for the communication and exchange of ideas is more effective than traditional approaches. It also has the potential to expand the relationships between teachers and students in China.

More than half of the teachers, 58%, send emails to their students (see Table 5.15). It shows that the schools' development of ICT has been rapid and popular. Male teachers make contact with their students by email more than the female teachers do (see Table 5.30) and the vast majority, almost three quarters, of the teachers using this method of communication with their students are under forty years old. Usually in

China, compared with the older teachers, young teachers are very popular with the students.

Nearly half of the teachers send emails to their colleagues (see Table 5.16). By now, in offices round the world that have embedded ICT, staff routinely communicate with each other by email. The young teachers like to use computers and the survey shows that the youngest group, those under 30 years old, are the most likely to use email to talk about their work (see Table 5.31). The strong relationships formed by the young staff means they like to talk to each other face to face. But surely, in the near future, teachers will use email in their work more and more than ever before.

The contact between teachers and their students' parents is very strong which is probably because of the traditional Chinese culture. There are parents meetings at least once a term as well as face to face discussions between teachers and the parents in private. So the teachers prefer not to send emails to the students' parents (see Table 5.17). Of the few teachers who do send emails to the students' parents it is significant that they are all under 40 years old and 75% of them are female (see Table 5.32).

7.3 Interpretation and discussion from the quantitative and qualitative analyses of the survey of students

7.3.1 Gender and age of the students in the survey

The researcher visited four schools in northern China to distribute the questionnaires for students. The gender distributions of the students who completed and returned the questionnaire are approximately 40% boys and 60% girls (see Table 5.34). Usually

there is equality in gender of the students who attend schools in the cities in China; however, in the countryside there are regularly more boys than girls in most schools.

The children start at their middle schools at the age of twelve. But some younger, very able, children are permitted to study with the twelve years old age group (see Table 5.35). The middle schools are separated into two sections: from twelve to sixteen years old is called junior, from sixteen to eighteen years old is called senior. Sometime there is a difference in ages of between one or two years of the children in a class.

7.3.2 Students using ICT in learning

From the survey, more than sixty percent of the students use a computer to help with their homework (see Table 5.36). Boys like to use computers with their work more than the girls. The differences in the age groups are quite interesting, the proportion of those who use the computer in the two younger age groups is over 70% but this falls to 59% for the 15 to 16 years olds and further to 52% for the over 16 years old students (see Table 5.55). At the age of 15 or 16 the students are just preparing for the entrance examinations for the high schools and they tend to do all their work in the traditional way of education in China.

The students start to learn to use a computer in their primary schools, which is before they are twelve years old. That gives the children confidence for when they start using ICT in their education at middle school. The children's learning experience with ICT will improve as the teachers' experience of using ICT in teaching grows. The youngest age group of the students, where 35% have been using a computer for more

than four years, have been using computers for longer than the oldest age group, where only 19% have been using one for more than for years (see Table 5.56). For the time being, the Government is putting more money into schools for technical equipment and the parents realise that computers are more and more important to them; using a computer will become a natural part of people's lives.

More than 60% of the students said they were sure that the computer helps their studies (see Table 5.38). The integration of ICT into the curriculum of schools in China to improve teaching and learning is becoming more and more popular and widespread. Student A said to the researcher that using ICT in the curriculum reduced the amount of work both teachers and students had to do. The mathematics teacher used a computer successfully to demonstrate some aspects of solid geometry to the students. It was not only colourful and interesting but it made the theoretical descriptions so much clearer for the students to understand.

Introducing different sorts of materials into lessons can help to stimulate the students' motivation and it can also help avoid the lesson becoming boring. Student A remarked about this positively during the interviews. The interviews gave a clear picture of the students' thoughts about ICT. Students A and B are very pleased when their teachers use ICT in their lessons and ask them to use a computer to help them complete their homework instead of writing it on paper. The students have found that more of their teachers have started to incorporate the new pedagogy with ICT into classroom. There is a gender difference for this view in that 9% of boys said the computer did not help their studies but 14% of girls had the same negative opinion (see Table 5.57). The negative response, of 16%, from those over 14 years old is marked. Maybe they do

not have a full view of what of ICT can do for them. Research by Passey et al (2004) (see Section 3.3.1) has shown a positive effect in England. They found that the use of ICT by teachers and students led to positive motivational outcomes for the students.

The schools appeared to offer a very good ICT learning experience. Most of the students, over 90%, could use a computer individually in their lessons; this gave them valuable opportunities to learn and practice their ICT skills. The students who had to share computers with others were able to help each other directly in group work and share their ideas with each other (see Table 5.39). More than 60% of the students from the survey said that they do not understand what ICT means (see Table 5.40). This result probably does not give quite the right impression because, from Table 4.38, more than 60% of the students said that the computer helped their studies; they do appreciate how computers can help their studies even though they might not be very clear as to the full meaning of ICT.

From research carried out in England, Wegerif (2002) (see Section 3.3.2) suggested that ICT is best thought of as a support and resource for dialogues in which thinking skills are taught. ICT is being used to support, not lead, the interactions of the students. This position for ICT in schools could benefit the students in China.

The researcher's interviews revealed that the students usually use computers for word processing rather than searching. This is a similar situation to the teachers, they have started to use the computer in their teaching, but still use the traditional ways to carry out most of their work. The researcher believes that, in the near future, the situation will change, with more and more Internet searching and independent work using ICT

being used in Chinese classrooms. The old teaching concepts could be replaced by modern technical and ICT based methodologies.

Over 56% of the students did not have any special computer training course at school (see Table 5.49). It is clear that 87% of both boys and girls have a computer at home (see Table 5.66) with none of the students in the youngest age group lacking this facility. Their parents have given great support to their children's education and the social life of students has become completely different than what it was even ten years ago.

64% of the students are allowed to use computers at home at any time (see Table 5.51). However, 19% of the students are restricted as to when they can use the home computers, this could be because their parents worry that the children could play computer games and reduce the study time they spend studying. The rest of the students never use a computer at home at all. There is a large difference between the boys and the girls; 60% of the girls are allowed to use the computers at home at any time with 71% of the boys having this privilege (see Table 5.67). Further analysis shows that, of the students in the survey who are allowed to use the home computer at any time they wish, 38% of them make no use of the computer when doing their homework (see Table 5.68). The environment and ethos of the school they attend and the way ICT is used in its curriculum may be factors for this surprising finding.

The unexpected answer from question nineteen (see Table 5.52) is that about half of the students said that they do not like their teachers to use an interactive whiteboard in their lessons. The interactive whiteboard is in its early stage of being used in schools

in China and so the quality of the teaching and learning experiences it can provide has not yet reached its full potential. The youngest age group in the analysis of this question gave by far the lowest positive response, of 18%, of all the age groups. The other age groups all gave similar proportions, of over 25%, of positive responses (see Table 5.69). The researcher believes that with the ongoing development of ICT within education in China, the percentage of the positive answer will increase considerably.

The students estimate that well over half of their subject teachers use a computer in their lessons (see Table 5.54). Some of the staff will use computers in their lessons at the beginning of the term but, towards the end of the term, most of the teachers start to focus on the examinations and so computers are not used so much. The sometimes negative experiences teachers have of using ICT is perhaps another reason that they try to avoid using it and resort to paper work.

7.3.3 Problems for students in using ICT

The students attending middle schools are usually reasonably confident in using computers. It is then that they need experienced teachers to guide them as to how to improve their use of ICT and how useful it could be to them in their studies. The problem is that Chinese students always waited for their teachers to give them instructions and were told not take their own initiative. From the very first day at school the students were instructed that they should do what the teachers told them, and they do not feel they can break with the old customs. Even though some of them have used computers for so many years they still do not know how to use them to help them in their studies. Of course in the meantime they have learned to play computer games very adeptly but have not developed their ICT skills for studying.

Well over 80% of the students like to use computers in their lessons, but this still leaves a substantial proportion who do not (see Table 5.42). One factor for this negative response is likely to be the lack of enthusiasm and expertise shown by some of the teachers in using ICT. The computer skills of some of the students will be better than that of their teachers and this can be a cause for disenchantment with the lesson and can have a detrimental effect on it. There is a marked gender difference in the replies to the students being asked if they like to use a computer in their lessons; almost 80% of the boys were certain they did as opposed to only 60% of the girls (see Table 5.58). There is also a difference between the age groups as well with 77% of those under 15 years old being positive about liking ICT in their lessons as opposed to 62% of older students being sure. What is surprising is that almost 20% of the students who say that computers help with their studies do not like to use them in lessons (see Table 5.59). This again could be a reflection on the ICT skills of their teachers. When interviewed some of the students said:

If we used the Internet in our lessons that would be good, but if the computer is just used to replace handwriting, like an electric piece of chalk that means nothing.

It would appear that the students are motivated by using ICT to its potential and that simply using a computer to replace the written word on a board is not worthwhile.

7.3.4 The Internet has changed the younger generation

Access to the Internet on the computers at school is one of the greatest improvements on the traditional Chinese methodologies of teaching and learning. The modern ICT techniques, integrated with appropriate new concepts, have given children a very fresh view of learning. But, having only 30% of the computers with provision to connect

with the Internet in schools is not sufficient for the massively growing interest from the children to use the Internet to help with their studies (see Table 5.43).

Using the Internet in teaching and learning is a very new approach for the Chinese students. Teachers and the students now are able to share their ideas with each other and this could change the relationship between them into a friendlier one. Student J voiced similar comments to this. But some students complain that accessing the Internet at school is very slow and that limits the time they can use it; this was the complaint of Student K. Some of the students do not like to share computers with others and Student L said he does not like to use the Internet near the end of the term; he needed to concentrate on revising for the examinations then.

Children like to communicate with each other, with almost half of them sending emails to their classmates (see Table 5.45). No doubt this number will increase considerably when more and more families buy a computer and use a broadband connection. Boys like to send emails to their classmates more than girls (see Table 5.62). The great majority, 82%, of the children do not send emails to their parents (see Table 5.47). The interviews with students revealed that the students sent emails to their parents usually when the families are regularly living apart or one or both of the parents are always very busy. They then tend to make contact with each other by using email. Again boys send emails to their parents more than girls (see Table 5.64).

The survey found that 80% of the students had access to the Internet at home while a further 8% used an Internet café (see Table 5.53). More and more Chinese families have a computer at home and use it to access the Internet to read the news or find

information as part of their lives. The proportions of male and female students who use their home computer to access the Internet are almost the same at over 70% (see Table 5.70). Over 10% of the students go to an Internet café to access the Internet.

Almost half of the students have Internet friends (see Table 5.48). Many of the students complain about their homework; they consider they are under a lot pressure from the large amount paperwork they have to do so most of their parents stop them going out. The children have found a different way to make friends and that is by using the Internet; it is quite an easy way for them to make friends. Girls are more likely to make friends from the Internet than boys (see Table 5.65). The analysis also shows that the older the students are, the greater is the proportion of them making friends through the Internet. This can be attributed to their increased confidence and social awareness as they grow up.

Three of the schools in the survey have a student ID card system (see Section 6.6.3). The ID card is rather like a university library card and it can also be used as a credit card inside the school. With the card the students can buy snacks in the school shop and use the school telephones. Students C, H and D talked about this with the researcher and were very enthusiastic about ID cards.

7.3.5 Relationships between students and teachers

Using computers in the classroom has changed the dynamics between the students and the teachers in many ways. The students who have more experience with computers could help their teacher in the classroom when technical problems arise; the student becomes an assistant teacher at that moment. The students were able to use different

ways to rectify the computer problems they encounter while at school (see Table 5.44). The proportion of boys solving problems themselves, at 36%, is 10% more than the girls; but 61% of girls are likely to ask a teacher for help compared with 49% of the boys (see Table 5.61). The computer connects the teachers with the children.

Student D is very happy with the changing relationships between teachers and students. The use of computers has given the students more opportunities to have personal interactions with the teachers. More and more often the students are asked to go to the front of the classroom to show the teachers and the other students their work and one of the students said this had given him more confidence. Student D, in the traditional teachers' eyes, is not an able student; his results are very poor, but he is good with computers. He always helps the teachers sort out any technical problems they have during a lesson. He has started to become very popular and it has given him chance to show his strengths.

Using ICT can offer different ways of teaching. Student E said they enjoyed lessons when the teacher used the Internet for searching for information; it is much better than just talking and talking. If the teacher could use different techniques in teaching it would be very popular. Student B said they prefer the teachers to use modern equipment in their lessons.

With schools in China being so large it is often difficult, when not in lessons, for teachers and students to have face to face communications. The students are not in the habit of sending emails to their teachers with only 14% communicating in this way (see Table 5.46). The integration of ICT into the schools in China has, in some ways,

changed the relationships between the teachers and the students, but outside the school campus the students are still not as comfortable with their teachers as they can be in the classroom itself. Girls are more likely to send emails to their teachers than boys. The 13 to 14 years old age group has the largest difference between the genders where more than twice as many girls send emails to teachers than boys (see Table 5.63). It would seem that young girls appear to have the confidence to communicate with people while boys possibly tend to keep things to themselves. The reason one of the boys sent an email to his teacher was because he had done something wrong and found it easier to apologise to the teacher by email rather than in person.

7.4 Whole school development

7.4.1 Financial provision

The four schools in the survey are all located in cities in the north east part of China. Compared with those in the north west and other poor regions of China, these four schools have good financial support. Although one of the schools now needs its equipment updating, this is after the Government initially provided the finance to set up the technical facilities at the school. The money needed for keeping the schools' computer equipment up to date needs to be raised by the schools themselves.

School A has obtained this funding from the students' parents. The reason for this is that the parents wanted to send their children to this school and, to ensure that their children's results are good enough to reach the requirement of the entrance

examinations they had to be prepared to give financial support to the school to provide the best facilities.

The headteacher of school D was not so fortunate, his school being located in a poor area. The pass rates in the entrance examinations are not so good and so the Local Education Bureau does not want to take the risk of putting money into the school.

Only three of the schools have a broadband connection. School D only has one computer linked to the Internet and that is in the headteacher's office. Teacher D said they struggle to find the right software packages for them to use. All the schools need more finance to provide facilities by way of ICT that teachers and students are starting to expect.

7.4.2 Management

The success of integrating ICT into the curriculum in School A is so different than that in School D. The headteacher in School A said that he had previously been a physics teacher for about twenty years. He likes technology and his school offers a good platform for him to make sure everything comes true. Although he is very busy he always finds time to pay a visit to the computer suite to have a look at what is happening there.

School D has never effectively utilised its computer suite and its other technical equipment. When the researcher visited the computer classroom it was full of dust. Every class had just one computer lesson every two weeks. That is what the situation was ten years ago in the other three schools. School C's computer suite was very

clean, but it had the same timetable as School D, each class having just one lesson in the computer suite every two weeks.

However, teachers have a role to play in management even if it is simply the management of the classrooms they use and the students they teach. Specific training in using ICT would give teachers more confidence in their management role, as was suggested by Selwood and Tang (2007) (see Section 3.2.2).

The integration of ICT into its administration has increased the efficiency of the schools' management. Headteacher A said that the management of the students' files (personal details and academic results) and teachers' files (personal details and appraisal information) are now well arranged and organised. Staff member L said to me she is full of praise for the person who invented the computer; it has reduced much of the workload of the administrator.

Not only are the schools' administrators released a lot from the paperwork but so are the Local Educational Bureau's staff as well. They have the same workload as the staff in the schools. Every term they have to calculate the rank of the schools in every subject and in every grade. Then there is a comparison to be made of the examination results for all the districts.

Headteacher B is pleased with the integration of ICT into his school. Specific computer software helps them to work out examination results and analyse them to help them plan how to improve the school's work.

The use of ICT in the management of schools in England is also usually limited to data entry and collation and does not go much beyond this; as was suggested by Pittard (2005) (see Section 3.3.1) The chance to use the data to help plan individual study plans for students is not being utilised in England, which is a similar situation to that in China at the moment.

There is a big difference in the integration of ICT into the curriculum between the schools. The best ICT provision has made a huge difference for a school. If a school has made a big investment in ICT then there are many rewards available to it. School A started to have fruitful results after integrating ICT into the curriculum, especially when the interactive whiteboards were introduced into teaching.

The key schools find it easy to obtain financial support from the government, the parents or other sponsors. Student G said his parents had given some money to his school so he could attend it because his result in the school's entrance examination was not good enough. The government is aware of the disadvantages of different standards between schools. It has introduced a policy in which a good school and poor school work together, some schools are amalgamated with another one or two schools in the city, but with each retaining its own campus. The idea was that they should share their expertise and good practices. School C was amalgamated with another two schools last year; it is too early yet to say what the outcomes have been from this merger.

7.5 Changes in the provision of education in China

The rapid economic increase in recent years in China has made many of the children's dreams come true. Many families have computers (see Table 5.50) and home access to the Internet (see Table 5.53) which has probably helped the children and the teachers improve their computer skills and searching abilities outside the campus.

The financial background of families can be an influential factor in developing the students' skills in using computers. Student F is from a very rich family, he started to play computer games when he was in the kindergarten and so developed his skills with a computer at an early age. The lack of such experiences could prove to be a great disadvantage to students who have no computer at home.

Limitations in infrastructure, access and reliability make some barriers for the further development of the ICT integrated school. The potential of teachers and students in their use of ICT in their teaching and learning environments has yet to be fully realised.

The change in the distribution of the population throughout the country is an important element in the economic development of China; it is also an important factor in the development of education throughout the country. There has to be a strategy to distribute and adjust the provision of educational resources and teachers' training so as to continuously improve the quality of the education and sustains its development. Some of the areas that should be considered are:

- The ratio of the teachers to the students

- Changes in the overall population
- Housing development and population distribution
- Educational resources allocation
- Reform of the personal system
- Teachers' qualifications

The literature review detailed the development of the use of computers in the curriculum of education in England. This was over a period of thirty years or so and the incorporation and integration of ICT throughout the curriculum of the schools has been seen in that time.

The literature review also focussed on a comparable development of ICT in schools in China. This is a much more recent phenomenon and has taken place over the very short space of time of ten years. It is arguable that the use of ICT in the key schools in the large cities in China is as good now as that in most schools in England.

The wide gap between the developed and the underdeveloped areas in China means that there is an educational unfairness for some of its young people. The government is trying to eliminate this inequality and give all the children equal opportunities for study. Crichton discussed this in 2006 (see Section 3.2). From 1997, after a series of policies from the government, more and more schools started to integrate ICT into the curriculum. However, in the west and poor places of China, there is little financial support for the schools. Even though some charities have helped some of the schools to purchase one or two computers; it is just not enough.

The great geographical distances and economic differences over the regions of China pose huge problems when attempting to provide all the children with a quality education. A wide ranging study undertaken by Eadie (2001) (see Section 3.4.1) shows the potential benefits of using ICT to connect schools over large distances. When analysing the best use of ICT in schools he found that those with geographic barriers to overcome were ahead of their counterparts in other areas. In the same context was the experience of using the Virtual Integrated Teaching and Learning Environment (VITLE) platform during the 2003 SARS outbreak in Hong Kong. Reviewing the effectiveness of this virtual classroom, Fung and Ledesma (2005) (see Section 3.4.1) reported that both teachers and students perceived the platform to be useful and convenient as they could access it from any computer with access to the Internet. There are few limitations of distance that would prevent this being used.

It is possible that the literature review can identify areas, from the past experiences of UK educators, that can be of use to professionals in China in avoiding pitfalls to its continued success in ICT being used extensively in schools throughout the country.

The Internet has changed education. Everybody is a teacher; everybody is a student. Now there is not strict boundary between teaching and learning. If you have any real knowledge and profound insight, whatever your position and whoever you are, everyone can learn from each other.

This realises the Confucian ideal: 'where there are three men walking together, one of them must be qualified to be my teacher'. Study is not only teaching, studying, completing homework, taking examinations etc. There is also listening, discussion and debating. To reach this stage, we must rely on the functions and resources of the Internet. So the collected knowledge of the human race is the foundation of the Educational Information Age.

(Li, 2005, p. 3)

Before ICT was integrated into teaching and learning, dictionaries and libraries were the main tools for people to use in their research and studies, especially in schools. Now the Internet is another useful source of information for the students to use in their studies. The key point is how to change the old concepts and attitudes to fully embrace the potential of ICT. Teachers have the chance to make adjustment to their methodologies to incorporate new educational concepts into their teaching.

The biology teacher who was interviewed by the researcher is very clear about the advantages of ICT; how to change teachers' opinions is important. Not only is the classroom a place for students and the teachers to study, and not only are the teachers disseminating knowledge to the students, but ICT can give another dimension to the teaching and learning process in which teachers and students work in harmony to the benefit of each other.

7.6 Examination focus of education

There are two entrance examinations that students take during their time in middle school. These are when the students transfer from the junior middle school to the senior middle school and from the senior middle school to university. The main subjects of Chinese, mathematics, physics, chemistry, English and politics are in the entrance examinations for both the senior middle school and university entrance examinations. History and geography are in the entrance examination for the university only for the students who are aiming to study social science at university.

The teachers did not have time to evaluate the students' learning by using ICT; they just focussed on the subject they taught and they thought that the examination results of the students mean everything (either good or otherwise).

All of the four schools have a students' database, but it is used only for checking their study marks and test results and the storing of the personal information of the students they are required to have. They don't have a system for keeping individual study records for the students and using these for tracking and assessing the academic progress of the students and creating individual study plans for them. The headteachers are very interested in the experience of the UK in this field and two of them have actually visited the England to see how these systems work in practice. They told the researcher at interview that they know this is very good for the students, but we are in China, and being in China we have to focus on the examinations. There is serious competition in the entrance examinations for this generation of students which is very understandable. If they do not have good examination results, they simply will not be able to go to the good universities and that to them, their families and their schools means failure. Fortunately, one of the headteachers is head of a key state school. He said he should not be concerned about the result at all, because his students were all very able. However, if his students' results did fall below expectation, it would effect next year's recruitment, funding and the name and standing of the school.

Teacher C said to the researcher that she likes computer software packages but time did not allow her to use them. She needed to focus all her efforts on helping her students prepare for the entrance examinations. This lack of time precludes her

incorporating ICT into her teaching and learning methodologies. The results of her students in these examinations could be the most important things for her in her career. Good results could impress the head and give her more chance for promotion and an increased bonus.

The Interview with teacher C also shows that the teachers are under pressure from their work. The examination focus makes it difficult for her to consider how to include ICT and develop her educational practices. Teacher G also has the same problem; the only limited way of using ICT is by using the computer at home to do homework. Teacher H was worried that the time taken to make a good teaching package would be a lot longer than she expected. Teacher F refused to use ICT towards the end term when examinations were the focus. That is the busy time for the students to prepare for the examinations. So all this mitigates against teachers introducing ICT into their methodologies.

This examination focus gives pressure to both the students and the teachers. Student J said he felt tired all the time. Everyday they have a lot of homework and after that they have to learn the work covered in their lessons until very late at night. Student K said he has the same feeling as student J, but he was resigned to it and said that is our life. If the teachers used different methods in their lessons, things might be different.

Not only in term time do students have to work hard for the final examinations, but the holiday maybe worse for some of the children. Student D is typical in complaining about this. There is a common phrase for the children; holiday is busier than term time. Compared with China the children at school in the UK seem to be happier. The

children in China often say that pensioners are in paradise in China and the children are in the hell.

When the main focus of the education system is on the examinations it can have inhibiting effects on the teachers' pedagogies and the learning experiences of the students. This was found to be the case in the research Eddie (2002) (see Section 3.4.1) carried out. He suggested that where there is a rigorous examination system it is much more difficult for innovative use of technology such as ICT to occur. This reinforces the dilemma expressed by some teachers in this survey of whether to spend time developing the use of ICT or concentrate on the examinations.

The contextual background to the Chinese educational system (see Chapter Two), mentioned that the graduation examination subjects are determined by the scope of those subjects set by the state that are taught in the graduating class (see Section 2.2.2). More than ten years ago, people started to argue about whether computer lessons should be one of the subjects in the curriculum or not because it is not like the traditional subjects such as Chinese, mathematics and physics. Today these arguments are still continuing with some people saying that China should not have computer studies as one of the subjects in the national curriculum. However, it is generally accepted that computer lessons can be useful in showing students how to use ICT properly in their studies and giving them the opportunity to practice and improve their computer skills. Dazhong Wang discussed this earlier in 2001 (see Section 3.2).

There are huge financial differences between the developed and developing area of China. Schools in the poor areas in the countryside and western China often do not

have enough basic equipment to support the students' study and in many the introduction of even simple ICT systems is not an option; the government is introducing plans in an attempt to eliminate this educational inequality.

Wang (2003), from Shandong Province Zaozhuang No.11 Middle School, discussed this problem.

Computer lesson could be the subject of the graduation examination. But think of the finance difference, we could think about to have a small percent of the score at the beginning.
(p.8)

The city of Zaozhuang has included computer studies as one of the subjects in the graduation examination for entrance to the senior middle school. Some of the schools in the poor areas have entered into a cooperation programme with a computer company to assist with the introduction of the ICT into their teaching and learning methodologies. This has already started to have a big impact on the provision of facilities and expertise for the use of ICT in the schools.

Wang (2003) commented:

Put computer studies in as one of the subjects of the graduation examination. But the exam paper could be very different compared with the other subjects. The third step is use the computer as a tool in different subjects.
(p.8)

7.7 Summary

The researcher has combined the analyses of the preceding two chapters together in this chapter. The findings that have resulted from the quantitative and qualitative analyses for the teachers have been combined together to form a coherent account of the situation that appertains to the teachers at present. It details their successes in incorporating ICT into their teaching and learning methodologies and the barriers they have found to making personal progress in this field. The quantitative and qualitative analyses for the students from the preceding two chapter have resulted in findings about their attitudes to ICT being used in the classroom and their positive and negative experiences of their teachers' success in using it in their learning programmes.

The next chapter discusses the conclusions that can be drawn from the interpretations and discussions of the findings from the quantitative and qualitative data. In particular these conclusions will be directed at the initial aims of the research to see how these have been addressed.

Chapter Eight

Conclusion

8.1 Introduction

This study examined the present use of ICT in the middle schools in two cities in north east China with the intention of ascertaining the possible future developments in its usage in a wider context.

The study focussed on the attitudes of teachers and students to the use of ICT in these middle schools and the impact it has had on teaching and learning methodologies. The views of teachers and students were elicited by means of a triangulation of quantitative and qualitative methods which involved using questionnaires, semi-structured interviews and lesson observations. The use of multiple methods for the collection of data was employed to avoid bias in the study.

Another element in this study was to determine to what extent the interpretations of the analyses of the findings could be generalised over a wider population than that from which the data was collected. This was undertaken by a review of the literature pertaining to this study emanating not only from China but from other countries in the world that had included ICT in the curricula of their schools. The resulting

combination of the experiences of other countries allied to the present situation in these two northern Chinese cities would be a guide as to how useful an extrapolation would be in making generalisations of the interpretations.

8.2 Globalisation

The rapid spread of ICT into the curriculum of middle schools in China has heralded the new information age for students and teachers. This study has shown that, through the incorporation of ICT, the use of the Internet in classrooms and homes is rapidly increasing. This new source of information has been welcomed by most professionals in education.

Schools in China are now included in the process of the globalisation of education. The teachers and students have increasing access to the wealth of information available through the Internet and, inevitably more and more will demand it. In order to meet these expectations the effective teaching of ICT in schools is essential to give the students the flexible skills they need to use the information intelligently.

China is a country rich in diverse cultures and traditions and the retention and development of these should be an important priority when faced with the globalisation of the development of technology in education.

8.3 Attitude of the teachers

Although all the teachers indicated that they were positive about using ICT in their teaching and learning methodologies it was apparent that some were doing it as a means of maximising their end of term bonuses. In these cases it was apparent that the

teachers were using ICT in a somewhat straightforward way as a supplement to their lessons rather than integrating it into their methodologies. There is, in China, a strongly held view that the government, national or local, knows what is best for the country and so its initiatives should be followed. This view is another reason why teachers are willingly using ICT in their lessons.

Whatever the reasons, many teachers have enthusiastically taken to using ICT in their methodologies and this includes some who were highly sceptical initially but found distinct advantages in incorporating this new technology. The main advantages expressed were that the students seemed much more motivated in the lessons where it was used, that any problems of discipline were much reduced and the relative ease of setting and marking homework when it could be done on a computer. The great majority of teachers were embracing ICT with enthusiasm and were eagerly anticipating new developments such as the interactive whiteboard.

It has to be stated that some of the more experienced teachers, who had developed effective traditional teaching methodologies, were very negative about ICT and were most reluctant to attempt to include it.

The education system in China is based on a rigorous examination system. This was commented upon frequently when teachers were interviewed. Good examination results reflect on the teachers and the schools and so their focus is unremitting. Research by Eddie (2002) (see Section 3.4.1) found that where there is a rigorous examination system it is much more difficult for innovative use of technology, such as

ICT, to occur. Many teachers said they felt they had to stop using ICT as the examinations neared and use traditional methods to prepare their students for them.

The main problem encountered by teachers in their efforts to incorporate ICT into their lessons was the availability of specific subject focussed in-service training. Teachers in China are not alone in facing this problem; research indicates that it is a barrier to the effective use of ICT in education in most countries. It appears that regular training focussed on immediate areas of concern is needed as opposed to more general training.

It is accepted that ICT is developing rapidly with new applications becoming available frequently. That the schools in the survey did not employ a technician to run their, at times extensive, ICT systems was a surprise. It appeared to put an extra, and perhaps unnecessary, load onto the computer studies teachers. The lack of good educational software, which was pointed out by some teachers, is a problem that is faced by teachers in many countries.

The use of educational software is the key computer application for the future of middle schools. Chinese schools should pay more attention to training teachers in computer skills as well as making educational software widely available. Both of these steps are vital, otherwise, even if enough good educational software is available, it will still be difficult to implement the computer-aided teaching initiatives if teachers do not know or do not want to know how to use ICT.

8.4 Attitude of the students

The majority of students were enthusiastic about their teachers using ICT. They commented that their lessons were more interesting when ICT was used and they found learning easier. Most students thought that computers helped with their studies and homework.

Although some of the students were disenchanted with lessons in which the teacher's expertise in using computers was much less than their own, others were excited by this situation because there was the prospect of them being able show their skills by helping if problems were encountered.

Most students commented that when ICT was used in lessons there appeared to be a more relaxed atmosphere in the classroom with students being able to converse with the teachers more freely. The students welcomed this change to the very strict format of traditional lessons in Chinese schools.

8.5 Use of the Internet

The teachers welcome the Internet as a source of information they can use in their lessons; they felt restricted before by the lack of wide ranging resources in the school libraries. The students did not appear to use the Internet too readily for school work but did so more in their social lives. The use of email was not entrenched as a means of communication for either teachers or students but most were using this method to a certain extent. Students would welcome being allowed to use the Internet more often in lessons but many teachers were reluctant to give them more freedom in this

direction because they were apprehensive that it would be misused without them knowing.

8.6 Management

All the schools in the survey collected data about the students, from personal details to academic information including test and examination results. It appeared that the limit to its use was to generate the ranking of students and the schools in the end of term examinations. There is, as yet, little attempt to use this information to produce individual programmes of study for the students, although some of the head teachers were interested in this possibility.

It is evident that the enthusiasm of the headteacher about teachers using ICT in their teaching has a substantial influence on how successfully it is used in the school. This is a situation that has been found in many other countries; that having enthusiastic senior staff is an important factor in the successful integration of ICT in the curriculum.

The Chinese Ministry of Education has outlined provisional administration methods for educational websites and on-line schools, exerting the jurisdiction of the Ministry over educational websites and Internet-based schools. The evidence from the data collected in this research indicates that teachers in the big cities at least are keen to use computers in their classrooms but there is also evidence that they lack the basic skills to do confidently.

8.7 Provision of education in China

The sheer size of China and the diversity of the socio-economic climate in the country prove difficult to overcome when attempting to give all its students a quality education. There is a huge difference in what students experience in their education in different regions. The government is financing initiatives to provide more equipment to the deprived areas and schools are being grouped together in order to exchange proven good practice. The successful use of virtual classrooms during the SARS outbreak is a pointer to a possible way of taking educational expertise to the more remote and poorer parts of the country.

ICT can deliver a virtual school featuring autonomous learning with students as the principal focus; a school without walls. This differs from traditional radio and TV based education in that it can provide interactive teaching and learning at any time and at any place with network access, providing easy and efficient access to a wealth of resources and thereby improving the quality of education. With the evolution of advanced distance learning, educational concepts, contents, modes of delivery and structures will change significantly.

The development of ICT in learning may provide more educational resources, which are nationally available, which are cost effective and which deliver learning more effectively. The evidence from the data collected by this study suggests that teachers and students in urban middle schools are keen to use new technologies in their teaching and learning. It would appear then that the Chinese government has a receptive community, in urban areas at least, in which to develop the use of ICT in schools. Since it can be argued that students in rural areas could be the main

beneficiaries of the use of ICT, as it could give them access to a much wider range of courses and materials than are currently available, it can be anticipated that they too will have positive attitudes to the use of ICT. However further research would be needed to confirm this theory.

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Appendices

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Appendix No. 1: Teachers' questionnaire

1. Gender

- A. Male B. Female

2. Age

- A. under 30 B. 30-under 40 C. 40 – under 50 D. over 50

3. What subject do you teach?

- A. Chinese B. Mathematics C. Others

4. How many years have you been teaching?

- A. Under 5 B. 5 – 10 C. 11 – 15 D. More than 15

5. Do you use a computer in your teaching?

- A. Regularly B. Sometimes

6. How many years have you been using a computer?

- A. Less than 1 B. 1 – 4 C. 5 – 7 D. More than 7

7. Does ICT help your teaching?

- A. Yes B. No

8. How many students share a computer in classes in your school?

- A. One each B. Several C. Don't know

9. Do you understand what ICT means?

- A. Yes B. No

10. Where can you use the Internet out of school?

- A. At home B. Friend's house C. Internet café D. I don't

11. Has your school a campus network?

- A. Yes B. No

12. Do teachers like to use computers in their lessons?

- A. Yes B. No

13. Can you access the Internet on the computers in your school?

- A. Yes B. Some of them C. No

14. How do you solve computer problems?

- A. Ask a computer teacher B. Ask a colleague C. By myself D. Other

15. Do you send emails to your students?

- A. Yes B. No C. Sometimes

16. Do you send emails to your colleagues?

A. Yes B. No

17. Do you send emails to parents?

A. Yes B. No

18. Does your school give ICT training for the teachers?

A. Yes B. No

19. What kind of computer do you own?

A. Laptop B. PC; no laptop C. Don't have one

20. Do you use an Interactive Whiteboard in your lessons?

A. Yes B. No

21. Can you use the school's computer suite at any time you want?

A. Yes B. No

22. Is there a computer in every classroom in your school?

A. Yes B. No

Appendix No. 2: Students' questionnaire

1. Gender

- A. Male B. Female

2. Age in years

- A. 10 – 12 B. 13 – 14 C. 15 – 16 D. 17 - 18

3. Do you use a computer for your homework?

- A. Yes B. No C. Sometimes

4. How many years have you used a computer?

- A. 0 – 1 B. 2 – 4 C. 5 – 7 D. More than 7

5. Does the computer help your studies?

- A. Yes B. No C. Not sure

6. How many students share a computer in lessons?

- A. One each B. Several C. Don't know

7. Do you understand what ICT means?

- A. Yes B. No C. Slightly

8. Does your school have a campus network?

- A. Yes B. No C. Don't know

9. Do you like to use a computer in lessons?

- A. Yes B. No C. Sometimes

10. Can you access the Internet on the computers at school?

- A. Yes B. Sometimes C. No

11. How do you solve computer problems at school?

- A. Ask a computer teacher B. Ask other teachers C. By myself D. Other ways

12. Do you send emails to your classmates?

- A. Yes, often B. No C. Sometimes

13. Do you send emails to your teachers?

- A. Yes B. No

14. Do you send emails to your parents?

- A. Yes B. No

15. Have you made any friends from using the Internet?

- A. Yes B. No

16. Does your school give special training to students in using computers?

A. Yes B. No

17. What sort of computer do you have at home?

A. Laptop B. PC; no laptop C. Don't have one

18. When can you use the computer at home?

A. Any time B. Weekends C. Sometimes D. Never

19. Do you like your teachers to use a Whiteboard in your lessons?

A. Yes B. No C. Don't know

20. How can you use the internet out of school?

A. At home B. Internet café – not home C. I don't

21. Do all your subject teachers use a computer in their lessons?

A. Yes B. No C. Some

Appendix No. 3: SPSS tables: analysis for teachers

Table 5.1 Question 1

Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	6	19.4	19.4	19.4
Female	25	80.6	80.6	100.0
Total	31	100.0	100.0	

Table 5.2 Question 2

Age

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid under 30	14	45.2	45.2	45.2
30 - under 40	12	38.7	38.7	83.9
40 - under 50	3	9.7	9.7	93.5
over 50	2	6.5	6.5	100.0
Total	31	100.0	100.0	

Table 5.3 Question 3

What subject do you teach?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Chinese	7	22.6	22.6	22.6
Mathematics	2	6.5	6.5	29.0
Others	22	71.0	71.0	100.0
Total	31	100.0	100.0	

Table 5.4 Question 4

How many years have you been teaching?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Under 5	9	29.0	29.0	29.0
5 - 10	11	35.5	35.5	64.5
11 - 15	6	19.4	19.4	83.9
More than 15	5	16.1	16.1	100.0
Total	31	100.0	100.0	

Table 5.5 Question 5**Do you use a computer in your teaching?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Regularly	27	87.1	87.1	87.1
	Sometimes	4	12.9	12.9	100.0
	Total	31	100.0	100.0	

Table 5.6 Question 6**How many years have you been using a computer?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1	5	16.1	16.1	16.1
	1 - 4	12	38.7	38.7	54.8
	5 - 7	8	25.8	25.8	80.6
	More than 7	6	19.4	19.4	100.0
	Total	31	100.0	100.0	

Table 5.7 Question 7**Does ICT help your teaching?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	31	100.0	100.0	100.0

Table 5.8 Question 8**How many students share a computer in classes in your school?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	One each	25	80.6	80.6	80.6
	Several	3	9.7	9.7	90.3
	Don't know	3	9.7	9.7	100.0
	Total	31	100.0	100.0	

Table 5.9 Question 9**Do you understand what ICT means?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	54.8	54.8	54.8
	No	11	35.5	35.5	90.3
	No response	3	9.7	9.7	100.0
	Total	31	100.0	100.0	

Table 5.10 Question 10**Where can you use the Internet out of school?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	At home	12	38.7	38.7	38.7
	Friend's house	13	41.9	41.9	80.6
	Internet cafe	2	6.5	6.5	87.1
	I don't	1	3.2	3.2	90.3
	No response	3	9.7	9.7	100.0
	Total	31	100.0	100.0	

Table 5.11 Question 11**Has your school a campus network?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	77.4	77.4	77.4
	No	7	22.6	22.6	100.0
	Total	31	100.0	100.0	

Table 5.12 Question 12**Do teachers like to use computers in their lessons?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	31	100.0	100.0	100.0

Table 5.13 Question 13**Can you access the Internet on the computers in your school?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	74.2	74.2	74.2
	Some of them	8	25.8	25.8	100.0
	Total	31	100.0	100.0	

Table 5.14 Question 14**How do you solve computer problems?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ask a computer teacher	11	35.5	35.5	35.5
	Ask a colleague	14	45.2	45.2	80.6
	By myself	4	12.9	12.9	93.5
	Other	2	6.5	6.5	100.0
	Total	31	100.0	100.0	

Table 5.15 Question 15**Do you send emails to your students?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes, often	8	25.8	25.8	25.8
	No	13	41.9	41.9	67.7
	Yes, sometimes	10	32.3	32.3	100.0
	Total	31	100.0	100.0	

Table 5.16 Question 16**Do you send emails to your colleagues?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	48.4	48.4	48.4
	No	16	51.6	51.6	100.0
	Total	31	100.0	100.0	

Table 5.17 Question 17**Do you send emails to parents?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	12.9	12.9	12.9
	No	26	83.9	83.9	96.8
	No response	1	3.2	3.2	100.0
	Total	31	100.0	100.0	

Table 5.18 Question 18**Does your school give ICT training for the teachers?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	29	93.5	93.5	93.5
	No	2	6.5	6.5	100.0
	Total	31	100.0	100.0	

Table 5.19 Question 19**What kind of computer do you own?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Laptop	3	9.7	9.7	9.7
	PC; no laptop	23	74.2	74.2	83.9
	Don't have one	5	16.1	16.1	100.0
	Total	31	100.0	100.0	

Table 5.20 Question 20

Do you use an Interactive Whiteboard in your lessons?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	7	22.6	22.6	22.6
No	20	64.5	64.5	87.1
No response	4	12.9	12.9	100.0
Total	31	100.0	100.0	

Table 5.21 Question 21

Can you use the school's computer suite at any time you want?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	20	64.5	64.5	64.5
No	11	35.5	35.5	100.0
Total	31	100.0	100.0	

Table 5.22 Question 22

Is there a computer in every classroom in your school?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	31	100.0	100.0	100.0

Table 5.23

Gender * Age Crosstabulation

Count

		Age				Total
		under 30	30 - under 40	40 - under 50	over 50	
Gender	Male	3	1	1	1	6
	Female	11	11	2	1	25
Total		14	12	3	2	31

Table 5.24

Gender * How many years have you been teaching? * Age Crosstabulation

Count

Age			How many years have you been teaching?				Total
			Under 5	5 - 10	11 - 15	More than 15	
under 30	Gender	Male	3	0			3
		Female	5	6			11
	Total		8	6			14
30 - under 40	Gender	Male	0	1	0	0	1
		Female	1	3	5	2	11
	Total		1	4	5	2	12
40 - under 50	Gender	Male			1	0	1
		Female			0	2	2
	Total				1	2	3
over 50	Gender	Male		0		1	1
		Female		1		0	1
	Total			1		1	2

Table 5.25

Gender * Do you use a computer in your teaching? * Age Crosstabulation

Count

Age			Do you use a computer in your teaching?		Total
			Regularly	Sometimes	
under 30	Gender	Male	3	0	3
		Female	10	1	11
	Total		13	1	14
30 - under 40	Gender	Male	0	1	1
		Female	10	1	11
	Total		10	2	12
40 - under 50	Gender	Male	1	0	1
		Female	1	1	2
	Total		2	1	3
over 50	Gender	Male	1		1
		Female	1		1
	Total		2		2

Table 5.26

Gender * How many years have you been using a computer? * Age Crosstabulation

Count

Age			How many years have you been using a computer?				Total
			Less than 1	1 - 4	5 - 7	More than 7	
under 30	Gender	Male	2	0	0	1	3
		Female	2	6	1	2	11
		Total	4	6	1	3	14
30 - under 40	Gender	Male	0	0	0	1	1
		Female	1	5	5	0	11
		Total	1	5	5	1	12
40 - under 50	Gender	Male		1	0	0	1
		Female		0	1	1	2
		Total		1	1	1	3
over 50	Gender	Male			0	1	1
		Female			1	0	1
		Total			1	1	2

Table 5.27

How many years have you been using a computer? * Do you use a computer in your teaching? * Age Crosstabulation

Count

Age			Do you use a computer in your teaching?		Total
			Regularly	Sometimes	
under 30	How many years have you been using a computer?	Less than 1	4	0	4
		1 - 4	5	1	6
		5 - 7	1	0	1
		More than 7	3	0	3
		Total	13	1	14
30 - under 40	How many years have you been using a computer?	Less than 1	1	0	1
		1 - 4	5	0	5
		5 - 7	4	1	5
		More than 7	0	1	1
		Total	10	2	12
40 - under 50	How many years have you been using a computer?	1 - 4	1	0	1
		5 - 7	1	0	1
		More than 7	0	1	1
		Total	2	1	3
over 50	How many years have you been using a computer?	5 - 7	1		1
		More than 7	1		1
		Total	2		2

Table 5.28

Gender * Where can you use the Internet out of school? * Age Crosstabulation

Count

Age			Where can you use the Internet out of school?					Total
			At home	Friend's house	Internet cafe	I don't	No response	
under 30	Gender	Male	1	2	0	0	0	3
		Female	2	6	1	1	1	11
		Total	3	8	1	1	1	14
30 - under 40	Gender	Male	0	1	0		0	1
		Female	6	2	1		2	11
		Total	6	3	1		2	12
40 - under 50	Gender	Male	0	1				1
		Female	1	1				2
		Total	1	2				3
over 50	Gender	Male	1					1
		Female	1					1
		Total	2					2

Table 5.29

Gender * How do you solve computer problems? * Age Crosstabulation

Count

Age			How do you solve computer problems?				Total
			Ask a computer teacher	Ask a colleague	By myself	Other	
under 30	Gender	Male	2	1	0		3
		Female	3	6	2		11
		Total	5	7	2		14
30 - under 40	Gender	Male	0	0		1	1
		Female	4	6		1	11
		Total	4	6		2	12
40 - under 50	Gender	Male	0	0	1		1
		Female	1	1	0		2
		Total	1	1	1		3
over 50	Gender	Male	1		0		1
		Female	0		1		1
		Total	1		1		2

Table 5.30

Gender * Do you send emails to your students? * Age Crosstabulation

Count

Age			Do you send emails to your students?			Total
			Yes, often	No	Yes, sometimes	
under 30	Gender	Male	1	2	0	3
		Female	3	5	3	11
	Total		4	7	3	14
30 - under 40	Gender	Male	0	0	1	1
		Female	3	5	3	11
	Total		3	5	4	12
40 - under 50	Gender	Male	1		0	1
		Female	0		2	2
	Total		1		2	3
over 50	Gender	Male		0	1	1
		Female		1	0	1
	Total			1	1	2

Table 5.31

Gender * Do you send emails to your colleagues? * Age Crosstabulation

Count

Age			Do you send emails to your colleagues?		Total
			Yes	No	
under 30	Gender	Male	1	2	3
		Female	7	4	11
	Total		8	6	14
30 - under 40	Gender	Male	0	1	1
		Female	6	5	11
	Total		6	6	12
40 - under 50	Gender	Male	1	0	1
		Female	0	2	2
	Total		1	2	3
over 50	Gender	Male		1	1
		Female		1	1
	Total			2	2

Table 5.32**Gender * Do you send emails to parents? * Age Crosstabulation**

Count

Age			Do you send emails to parents?			Total
			Yes	No	No response	
under 30	Gender	Male	0	3		3
		Female	2	9		11
	Total		2	12		14
30 - under 40	Gender	Male	1	0		1
		Female	1	10		11
	Total		2	10		12
40 - under 50	Gender	Male		1	0	1
		Female		1	1	2
	Total			2	1	3
over 50	Gender	Male		1		1
		Female		1		1
	Total			2		2

Table 5.33**Gender * Do you use an Interactive Whiteboard in your lessons? * Age Crosstabulation**

Count

Age			Do you use an Interactive Whiteboard in your lessons?			Total
			Yes	No	No response	
under 30	Gender	Male	0	3		3
		Female	3	8		11
	Total		3	11		14
30 - under 40	Gender	Male	0	1	0	1
		Female	3	5	3	11
	Total		3	6	3	12
40 - under 50	Gender	Male	0	1		1
		Female	1	1		2
	Total		1	2		3
over 50	Gender	Male		0	1	1
		Female		1	0	1
	Total			1	1	2

Appendix No. 4: SPSS Tables: analysis for students

Table 5.34 Question 1

Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	86	36.3	36.3	36.3
Female	151	63.7	63.7	100.0
Total	237	100.0	100.0	

Table 5.35 Question 2

Age in years

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 10 - 12	11	4.6	4.6	4.6
13 - 14	51	21.5	21.5	26.2
15 - 16	116	48.9	48.9	75.1
17 - 18	59	24.9	24.9	100.0
Total	237	100.0	100.0	

Table 5.36 Question 3

Do you use a computer for your homework?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	70	29.5	29.5	29.5
No	92	38.8	38.8	68.4
Sometimes	73	30.8	30.8	99.2
No response	2	.8	.8	100.0
Total	237	100.0	100.0	

Table 5.37 Question 4

For how many years have you used a computer?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0 - 1	80	33.8	33.8	33.8
2 - 4	103	43.5	43.5	77.2
5 - 7	32	13.5	13.5	90.7
more than 7	21	8.9	8.9	99.6
No response	1	.4	.4	100.0
Total	237	100.0	100.0	

Table 5.38 Question 5**Does the computer help your studies?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	145	61.2	61.2	61.2
No	29	12.2	12.2	73.4
Not sure	60	25.3	25.3	98.7
No response	3	1.3	1.3	100.0
Total	237	100.0	100.0	

Table 5.39 Question 6**How many students share a computer in lessons?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1 each	217	91.6	91.6	91.6
Several	4	1.7	1.7	93.2
Don't know	14	5.9	5.9	99.2
No response	2	.8	.8	100.0
Total	237	100.0	100.0	

Table 5.40 Question 7**Do you understand what ICT means?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	77	32.5	32.5	32.5
No	144	60.8	60.8	93.2
Slightly	16	6.8	6.8	100.0
Total	237	100.0	100.0	

Table 5.41 Question 8**Does your school have a campus network?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	160	67.5	67.5	67.5
No	27	11.4	11.4	78.9
Don't know	49	20.7	20.7	99.6
No response	1	.4	.4	100.0
Total	237	100.0	100.0	

Table 5.42 Question 9**Do you like to use a computer in your lessons?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	156	65.8	65.8	65.8
	No	40	16.9	16.9	82.7
	Sometimes	41	17.3	17.3	100.0
	Total	237	100.0	100.0	

Table 5.43 Question 10**Can you access the Internet on the computers at school?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	71	30.0	30.0	30.0
	Sometimes	100	42.2	42.2	72.2
	No	63	26.6	26.6	98.7
	No response	3	1.3	1.3	100.0
	Total	237	100.0	100.0	

Table 5.44 Question 11**How do you solve computer problems at school?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ask the computer teacher	63	26.6	26.6	26.6
	Ask other teachers	71	30.0	30.0	56.5
	By myself	69	29.1	29.1	85.7
	Other ways	32	13.5	13.5	99.2
	No response	2	.8	.8	100.0
	Total	237	100.0	100.0	

Table 5.45 Question 12**Do you send emails to your classmates?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes, often	113	47.7	47.7	47.7
	No	54	22.8	22.8	70.5
	Sometimes	65	27.4	27.4	97.9
	No response	5	2.1	2.1	100.0
	Total	237	100.0	100.0	

Table 5.46 Question 13**Do you send emails to your teachers?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	33	13.9	13.9	13.9
No	202	85.2	85.2	99.2
No response	2	.8	.8	100.0
Total	237	100.0	100.0	

Table 5.47 Question 14**Do you send emails to your parents?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	42	17.7	17.7	17.7
No	195	82.3	82.3	100.0
Total	237	100.0	100.0	

Table 5.48 Question 15**Have you made any friends from using the Internet?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	110	46.4	46.4	46.4
No	127	53.6	53.6	100.0
Total	237	100.0	100.0	

Table 5.49 Question 16**Does your school give special training to students in using computers?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	100	42.2	42.2	42.2
No	134	56.5	56.5	98.7
No response	3	1.3	1.3	100.0
Total	237	100.0	100.0	

Table 5.50 Question 17**What sort of computer do you have at home?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Laptop	27	11.4	11.4	11.4
	PC; no laptop	180	75.9	75.9	87.3
	Don't have one	30	12.7	12.7	100.0
	Total	237	100.0	100.0	

Table 5.51 Question 18**When can you use the computer at home?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Any time	151	63.7	63.7	63.7
	Weekends	13	5.5	5.5	69.2
	Sometimes	31	13.1	13.1	82.3
	Never	39	16.5	16.5	98.7
	No response	3	1.3	1.3	100.0
	Total	237	100.0	100.0	

Table 5.52 Question 19**Do you like your teachers to use a Whiteboard in your lessons?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	63	26.6	26.6	26.6
	No	115	48.5	48.5	75.1
	Don't know	59	24.9	24.9	100.0
	Total	237	100.0	100.0	

Table 5.53 Question 20**How can you use the internet out of school?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	At home	190	80.2	80.2	80.2
	Internet cafe - not home	19	8.0	8.0	88.2
	I don't	28	11.8	11.8	100.0
	Total	237	100.0	100.0	

Table 5.54 Question 21

Do all your subject teachers use a computer in their lessons?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	107	45.1	45.1	45.1
No	106	44.7	44.7	89.9
Some	24	10.1	10.1	100.0
Total	237	100.0	100.0	

Table 5.55

Gender * Do you use a computer for your homework? * Age in years Crosstabulation

Count

Age in years			Do you use a computer for your homework?				Total
			Yes	No	Sometimes	No response	
10 - 12	Gender	Male	1	0	4		5
		Female	3	3	0		6
		Total	4	3	4		11
13 - 14	Gender	Male	8	7	10	1	26
		Female	8	7	10	0	25
		Total	16	14	20	1	51
15 - 16	Gender	Male	20	14	7		41
		Female	19	34	22		75
		Total	39	48	29		116
17 - 18	Gender	Male	1	8	5	0	14
		Female	10	19	15	1	45
		Total	11	27	20	1	59

Table 5.56

Gender * For how many years have you used a computer? * Age in years Crosstabulation

Count

Age in years			For how many years have you used a computer?					Total
			0 - 1	2 - 4	5 - 7	more than 7	No response	
10 - 12	Gender	Male	0	5	0			5
		Female	1	1	4			6
		Total	1	6	4			11
13 - 14	Gender	Male	5	16	2	3		26
		Female	8	9	7	1		25
		Total	13	25	9	4		51
15 - 16	Gender	Male	17	14	7	2	1	41
		Female	31	30	10	4	0	75
		Total	48	44	17	6	1	116
17 - 18	Gender	Male	3	7	1	3		14
		Female	15	23	2	5		45
		Total	18	30	3	8		59

Table 5.57

Gender * Does the computer help your studies? * Age in years Crosstabulation

Count

Age in years			Does the computer help your studies?				Total
			Yes	No	Not sure	No response	
10 - 12	Gender	Male	5				5
		Female	6				6
		Total	11				11
13 - 14	Gender	Male	18	0	7	1	26
		Female	21	1	3	0	25
		Total	39	1	10	1	51
15 - 16	Gender	Male	27	4	10		41
		Female	50	10	15		75
		Total	77	14	25		116
17 - 18	Gender	Male	5	4	5	0	14
		Female	13	10	20	2	45
		Total	18	14	25	2	59

Table 5.58**Gender * Do you like to use a computer in your lessons? * Age in years
Crosstabulation**

Count

Age in years			Do you like to use a computer in your lessons?			Total
			Yes	No	Sometimes	
10 - 12	Gender	Male	4	1	0	5
		Female	5	0	1	6
		Total	9	1	1	11
13 - 14	Gender	Male	24	1	1	26
		Female	15	8	2	25
		Total	39	9	3	51
15 - 16	Gender	Male	32	7	2	41
		Female	49	15	11	75
		Total	81	22	13	116
17 - 18	Gender	Male	7	0	7	14
		Female	20	8	17	45
		Total	27	8	24	59

Table 5.59**Does the computer help your studies? * Do you like to use a computer in your lessons?
Crosstabulation**

Count

		Do you like to use a computer in your lessons?			Total
		Yes	No	Sometimes	
Does the computer help your studies?	Yes	101	27	17	145
	No	13	7	9	29
	Not sure	41	6	13	60
	No response	1	0	2	3
Total		156	40	41	237

Table 5.60

How many years have you used a computer? * Do you like to use a computer in lessons? Crosstabulation

Count		Do you like to use a computer in lessons?			Total
		Yes	No	Sometimes	
How many years have you used a computer?	0 - 1	63	9	8	80
	2 - 4	63	18	24	105
	5 - 7	18	10	5	33
	more than 7	11	3	4	18
	No response	1	0	0	1
Total		156	40	41	237

Table 5.61

Gender * How do you solve computer problems at school? * Age in years Crosstabulation

Count			How do you solve computer problems at school?					Total
			Ask the computer teacher	Ask other teachers	By myself	Other ways	No response	
Age in year:	Gender	Male	2	0	2	1	0	5
		Female	0	3	1	1	1	6
		Total	2	3	3	2	1	11
13 - 14	Gender	Male	7	6	13	0		26
		Female	12	6	4	3		25
		Total	19	12	17	3		51
15 - 16	Gender	Male	6	15	12	7	1	41
		Female	29	21	19	6	0	75
		Total	35	36	31	13	1	116
17 - 18	Gender	Male	2	4	3	5		14
		Female	5	16	15	9		45
		Total	7	20	18	14		59

Table 5.62

Gender * Do you send emails to your classmates? * Age in years Crosstabulation

Count

Age in years			Do you send emails to your classmates?				Total
			Yes, often	No	Sometimes	No response	
10 - 12	Gender	Male	4	0	1		5
		Female	2	3	1		6
		Total	6	3	2		11
13 - 14	Gender	Male	16	6	4		26
		Female	13	6	6		25
		Total	29	12	10		51
15 - 16	Gender	Male	20	11	10		41
		Female	33	19	23		75
		Total	53	30	33		116
17 - 18	Gender	Male	7	2	5	0	14
		Female	18	7	15	5	45
		Total	25	9	20	5	59

Table 5.63

Gender * Do you send emails to your teachers? * Age in years Crosstabulation

Count

Age in years			Do you send emails to your teachers?			Total
			Yes	No	No response	
10 - 12	Gender	Male	1	4		5
		Female	1	5		6
		Total	2	9		11
13 - 14	Gender	Male	4	22	0	26
		Female	9	15	1	25
		Total	13	37	1	51
15 - 16	Gender	Male	4	36	1	41
		Female	11	64	0	75
		Total	15	100	1	116
17 - 18	Gender	Male	1	13		14
		Female	2	43		45
		Total	3	56		59

Table 5.64

**Gender * Do you send emails to your parents? * Age in years
Crosstabulation**

Count

Age in years			Do you send emails to your parents?		Total
			Yes	No	
10 - 12	Gender	Male	1	4	5
		Female	1	5	6
	Total		2	9	11
13 - 14	Gender	Male	9	17	26
		Female	7	18	25
	Total		16	35	51
15 - 16	Gender	Male	6	35	41
		Female	12	63	75
	Total		18	98	116
17 - 18	Gender	Male	1	13	14
		Female	5	40	45
	Total		6	53	59

Table 5.65

**Gender * Have you made any friends from using the Internet? * Age in years
Crosstabulation**

Count

Age in years			Have you made any friends from using the Internet?		Total
			Yes	No	
10 - 12	Gender	Male	3	2	5
		Female	1	5	6
	Total		4	7	11
13 - 14	Gender	Male	12	14	26
		Female	9	16	25
	Total		21	30	51
15 - 16	Gender	Male	18	23	41
		Female	38	37	75
	Total		56	60	116
17 - 18	Gender	Male	4	10	14
		Female	25	20	45
	Total		29	30	59

Table 5.66

Gender * What sort of computer do you have at home? * Age in years Crosstabulation

Count

Age in years			What sort of computer do you have at home?			Total
			Laptop	PC; no laptop	Don't have one	
10 - 12	Gender	Male	5	0		5
		Female	1	5		6
	Total		6	5		11
13 - 14	Gender	Male	3	18	5	26
		Female	5	16	4	25
	Total		8	34	9	51
15 - 16	Gender	Male	4	32	5	41
		Female	4	61	10	75
	Total		8	93	15	116
17 - 18	Gender	Male	1	12	1	14
		Female	4	36	5	45
	Total		5	48	6	59

Table 5.67

Gender * When can you use the computer at home? * Age in years Crosstabulation

Count

Age in years			When can you use the computer at home?					Total
			Any time	Weekends	Sometimes	Never	No response	
10 - 12	Gender	Male	5					5
		Female	6					6
	Total		11					11
13 - 14	Gender	Male	22	1	1	2		26
		Female	14	3	0	8		25
	Total		36	4	1	10		51
15 - 16	Gender	Male	25	1	4	9	2	41
		Female	44	3	15	13	0	75
	Total		69	4	19	22	2	116
17 - 18	Gender	Male	9	2	1	1	1	14
		Female	26	3	10	6	0	45
	Total		35	5	11	7	1	59

Table 5.68

**When can you use the computer at home? * Do you use a computer for your homework?
Crosstabulation**

Count

		Do you use a computer for your homework?				Total
		Yes	No	Sometimes	No response	
When can you use the computer at home?	Any time	51	58	42	0	151
	Weekends	2	8	2	1	13
	Sometimes	8	11	12	0	31
	Never	9	13	16	1	39
	No response	0	2	1	0	3
Total		70	92	73	2	237

Table 5.69

Gender * Do you like your teachers to use a Whiteboard in your lessons? * Age in years Crosstabulation

Count

Age in years			Do you like your teachers to use a Whiteboard in your lessons?			Total
			Yes	No	Don't know	
10 - 12	Gender	Male	2	2	1	5
		Female	0	4	2	6
	Total	2	6	3	11	
13 - 14	Gender	Male	6	18	2	26
		Female	7	11	7	25
	Total	13	29	9	51	
15 - 16	Gender	Male	13	18	10	41
		Female	19	38	18	75
	Total	32	56	28	116	
17 - 18	Gender	Male	4	4	6	14
		Female	12	20	13	45
	Total	16	24	19	59	

Table 5.70

Gender * How can you use the internet out of school? * Age in years Crosstabulation

Count

			How can you use the internet out of school?			Total
			At home	Internet cafe - not home	I don't	
Age in years	Gender					
10 - 12	Gender	Male	4		1	5
		Female	6		0	6
	Total		10		1	11
13 - 14	Gender	Male	17	3	6	26
		Female	17	1	7	25
	Total		34	4	13	51
15 - 16	Gender	Male	29	5	7	41
		Female	48	13	14	75
	Total		77	18	21	116
17 - 18	Gender	Male	12	2	0	14
		Female	36	3	6	45
	Total		48	5	6	59

Appendix No. 5: Sample of an interview with a teacher

Introduction:

1. Introducing the researcher, the study and the ICT in schools in China research;
2. Getting informed consent for the interview
3. Discussing the confidentiality issues
4. Introducing the procedures of the interview and note taking.

The Interview with Teacher A

1. Do you think that ICT has changed teaching and learning in your school?
Compared with the traditional Chinese teaching methods, are there any advantages in using ICT in the classroom?

Using ICT in the classroom has completely changed our traditional Chinese teaching style. With the use of animations, videos, images, colour and sound I feel I am not only a teacher, I am a presenter and organiser in front of the students. It is hard now to find students who are not interested in my lessons. They like me to use modern equipment to help with my teaching. It seems to motivate the students and there are very few discipline problems in my lessons now.

2. Do the teachers like to integrate ICT into the curriculum or do they do it because they are directed to by the government's policies?

To be honest, at the beginning when the school asked us to integrate ICT into the curriculum, I couldn't accept it. I didn't think that this

could be any better than the traditional educational methods. From my point of view, using ICT for my preparation and searching for information was all right, but it is not for the classroom. My computer skills were just good enough for searching and basic technical applications; I did not want to lose face in front of my students by getting things wrong. Once I tried to use the computer in class and asked the students to finish their homework on the disk. I found that it saved me a lot of time when I came to mark it. I used to carry a lot of students' work back home with me. After that, if I needed to, I just saved all the students' files into my laptop computer and marked it at school or occasionally at home. My subject is Chinese; there is a lot of writing work in my teaching. I saved all the written work in a USB before I started and now I can use it when I need to during my lessons. It's marvellous.

3. Are all the teachers and the students enthusiastic about using ICT? Tell me if your lessons are any different after you have integrated ICT into your teaching.

Some of my students are very good at using computers and are better at it than me. Occasionally they help me to sort out the problems that I am having difficulty with. I have to be a student; that is the benefit for both teachers and students. I must admit that I now enjoy using computers in my work. It takes me a bit longer at the moment to prepare my lessons but I expect that will get better soon. The effort is worth it though because I am sure that the students get more out of my lessons when I do use ICT.

4. What do the other teachers think about using ICT in the classroom?

Oh, the teachers have a lot of different views. I am afraid that some of our older staff do not like the thought of changing their traditional techniques. I can understand what they mean because they have spent

many years getting it right and it must be hard to think about changing. Some of the teachers are just using ICT a little bit so they can have a good bonus.

5. What do you think about the ICT equipment your school? What financial support does the government give your school?

The ICT equipment we have is very good and up-to-date. As a teacher I am not told about the finance of the school, but I know that a lot of the parents give money to help us have the best. They know it will help their children, I suppose.

6. Is the focus still on the examinations? Does the subject you teach make you use ICT more or not?

The examination is very important to the school. We picked the best students to come here. People expected them to be very good. Even the students are good I have to do a lot of careful revision with them. I teach Chinese and, as you know yourself, it is a very important subject in all the examinations the students have to take.

At this point the interview had already lasted for 25 minutes and Teacher A had to go to his next lesson. The next two questions indicate the areas the interview would have moved on to discuss if time had been available.

7. How much do you use the Internet used in the classroom?
8. Describe what the relationships between the students and the teachers are like since ICT has been introduced.

Appendix No. 6: Sample of an interview with a student

Introduction:

1. Introducing the researcher, the study and the ICT in schools in China research;
2. Getting informed consent for the interview
3. Discussing confidentiality issue
4. Introducing the procedures of the interview and note taking.

Interview with Student B

1. How do you think ICT has changed teaching in your school? Compared with the traditional Chinese teaching style, do you think there any advantages to using ICT in the classroom?

The teachers who can use modern equipment in their teaching are good teachers. They understand this is the best way to make the students interested. Just talking all the way through the lesson is boring. With the old style it is always hard to get the teacher to answer our questions. We had to try to work things out by ourselves.

2. Are the students happy with their teachers using ICT? Tell me something about how ICT has changed your lessons.

Yes, I think lessons with ICT are great. Teachers using videos and computers in our lessons have changed our lives. Being able to use a computer to finish our homework is very different for us. It has saved a

lot of our time. As well as making the lessons more interesting it usually makes things easier to understand.

3. What do you think about the ICT equipment in your school?

It is not too bad. Sometimes things go wrong but it does not seem to matter, it is good fun.

4. Are the examinations still very serious?

From last year, more and more teachers have changed their usual way of teaching. Probably that is because the head encouraged them to do so, any way this is a great change for the classroom. Even though our study pressure is still the same; this is a good start. The teachers seem to stop using computers when the examinations are close and then we go back to the old methods. The examinations are just so important.

5. Do you have chance to use the Internet in your lessons? What do you think about Internet café?

Not very often yet and when we do the teachers seem worried we might look at other things on it. I haven't tried to yet. We have a computer at home that I can use so I have not visited an Internet café.

6. How has ICT changed relationships between the students and the teachers?

It seems a lot friendlier. When we are using computers in a lesson there are times teacher will ask us for help and we all try to help and talk as much as we can.

Appendix No. 7: Sample of a lesson observation

Introduction:

1. Introducing the researcher, the study and the ICT in schools in China research;
2. Discussing confidentiality issue
3. Discussed the lesson plan with the teacher
4. Introducing the procedures of the observation; using note taking and possibly using a digital camera.

Observation:

English Lesson: Senior Middle School, Grade One, 16 years old

Teaching aims:

1. Start to learn Lesson Six
2. Warming up

Oral practice everyday: Environmental protection

3. Reading

Students read out their pre-work for the teacher and the rest of the class that they searched from Internet about this lesson before class

4. PowerPoint Presentation on the interactive Whiteboard

Pollution of the Yellow River.

Views of the source of the river in Tibet Mountain

Crystal clear and you can see right down to the bottom of the river

Becomes yellow from Gansu Province, but the yellow is natural.

The river flows along the boarder of Shan Xi Province and Shanxi Province.

Pictures of coal mining of Shan Xi Province and of production of iron in Shanxi Province

Pictures of dirty, black and brown of the river and patches of oil floating on the river as well as a lot of rubbish

Pictures of dam on the river and the slide bullet point why the dam is used: for industry, agriculture and drinking.

Near the mouth of the river in Shandong Province it has become very small

There is a picture showed the original river shape thirty years ago when it was a big river flowing into the sea

5. Speaking

Students talk about the presentation

Teacher corrects any English mistake

6. Writing

The key grammar in this lesson on the interactive Whiteboard

Past perfect tense

Vocabulary and useful phrases

7. Homework

Homework on the interactive Whiteboard