An Analysis of ICT Integration within the Jordanian Education System

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Certificate Of Authorship/Originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that this thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Candidate

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Abstract

This thesis explores the integration of Information and Communication Technology (ICT) within the educational system of Jordan. Educational systems worldwide are vigorously pursuing the integration of ICT as a means of staying abreast of the rapid technological changes associated with the knowledge-based economy, and the Jordanian education system is no exception, leading it to introduce several national initiatives in recent years.

There has been considerable research undertaken into the impact of ICT upon society and upon educational systems, but such studies have been generally confined to Western contexts. In the Middle East and North Africa (MENA) region, including Jordan, the little research which exists has been conducted for the most part by Western experts or international organisations.

Moreover, in spite of massive spending on education by governments of the MENA region, there have been warnings of a serious and widening gap between current schooling outcomes and the skills required for effective participation in globalised workplaces. Therefore, the Jordanian education system has implemented two national projects, *Education Reform for the Knowledge Economy* (ERfKE), and the *Jordan Education Initiative* (JEI), which aim to equip the system and students with skills and knowledge to participate effectively in the new era.

In examining the ways in which ICT integration has been planned and implemented in Jordan, the study investigated the roles of all three levels of the Jordanian education system: the central Ministry of Education, the regional directorates, and schools themselves.

Research data were gathered using a mixed method approach, which combined the use of questionnaires and case studies. The study was conducted in two phases: in Phase1, two standard questionnaires were distributed to 120 teachers and 12 principals from the three regions of Jordan: North, Central, and South. Phase2 comprised two case studies involving two schools which were found to have optimal conditions for ICT

integration compared with other schools in Jordan. The investigation in Phase2 included interviews, observations, site visits, and document analysis.

The study identifies and explores three issues which are fundamental to the integration of ICT in the Jordanian education system. These are first, the geo-political location of Jordan in the Middle East, and the impact that turbulence in the region has upon education systems; second, the economic constraints experienced by Jordan as a developing country, which necessitate collaboration with private sector and international parties, and third, the internal and external complexity of factors which surround ICT integration initiatives.

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DCU:	Development and Coordination Unit
ECDL:	European Computer Driving License
ERfKE:	Education Reform for the Knowledge Economy
GDP:	Gross Domestic Product
GNP:	Gross National Product
HRDSIL:	Human Resource Development Sector Investment Loan
ICDL:	International Computer Driving License.
iEARN:	International Education and Resource Network
ICT:	Information and Communication Technology.
JEI:	Jordan Education Initiative
MENA:	Middle East and North Africa region
QRC:	Queen Rania Centre
UNDP:	United Nations Development Programme
UNESCO:	United Nations Educational, Scientific, and Cultural Organization
USAID:	U.S. Agency for International Development

Chapter 1

Introduction to the Research

> *…we start full of energy and we improve, then what we develop does not get implemented.*
>
> Salem, an official from the
> Ministry of Education
> December 6, 2005

1.1   Impetus for the research

A fifteen-minute trip from my hometown to the main city in the northern part of Jordan (Irbid) had always triggered my thoughts and questions. The road to Irbid is a main route to a number of ancient sites and resorts, which make the road popular and remarkably busy, especially in summer. The Department of Agriculture has for many years been trying to beautify this road by planting trees on both sides of the road. The sight of workers digging holes and planting trees along the road used to be impressive. Passing by workers engaged with planting would prompt my imagination to picture the road in coming years lined with plenty of green trees, making the landscape more attractive and eye-catching for travelers. The sight of workers always left me with anticipation and expectation. But after many years of planting and re-planting, the sight started to trigger skepticism and wonder, rather than anticipation and excitement. The shift in my own reaction and thoughts resulted from the repetition of the same scene with workers doing the same job year after year. Workers were becoming older, some of them were approaching their retirement and the road had gained only a few patches of green, which was far less than I was expecting or hoping for. Only a few trees remained standing in the landscape as witnesses to the planting projects. The patches of green seemed tiny when weighed against the immensity of the work and cost spent on planting. In the end, the road remained virtually unchanged, with a small number of trees, despite the work which continued to be done. Effort and money were being spent repeatedly on doing the same thing with minimal results.

The climate in Jordan is hot and dry in summer and the country is one of the ten poorest in the world in its water resources. It is commonplace in such a dry climate that planting trees needs irrigation to assist plants to cope with the dryness of summer. Thus, the outcomes of the plantation seemed highly predictable. Nevertheless, planting continued with the same strategy, without securing water resources or trying to plant different trees which might be more adaptable to the local climate.

Later, when I started to study information and communication technologies (ICT) integration across the Jordanian educational system, the picture of workers beautifying the road sparked again in my mind, triggering education-related questions. The questions were related to the Ministry of Education's effort to achieve educational reform by *greening* the educational system through ICT integration. Several initiatives were introduced in order to prepare the system for the information age. The question about the failure of massive effort to make a radical change in a road's landscape seemed similar to educational reform efforts. A careful selection of plants and different strategies might resulted in better achievements. In addition, ensuring the availability of resources to maintain the initial start of the project and give it extra priority, would have given the reform a better chance for survival.

The scarcity of resources available for reform in Jordan makes sustaining spending on large-scale educational reforms immensely challenging. At the same time, outcomes cannot be considered a success unless they are sustainable. Clearly, adopting ICT is an expensive decision due to the front-end and the recurrent expenses, and therefore, the decision of ICT integration should be considered as the first step for the integration and the decision's effectiveness relies substantially on its implementation and sustainability.

1.2   Developing research questions

I entered this research with a general intent to explore Jordanian teachers' adoption of ICT in their teaching. This was due to my belief in the central role of teachers in students' learning with ICT. Over time this evolved into a broader issue involving the educational system and the country's context in general. The earlier stages of the research led me to extend the investigation beyond teachers' uptake of ICT. Teachers are bonded to a complex organization, and their adoption and practices are

interconnected with what occurs at the other levels of the organization. The strong influence of the organization over teachers' adoption and practices was also reinforced by bureaucratic and top-down approach to educational change. Although this appeared to be the case of many educational interventions in Jordan, it was particularly so in respect of ICT integration.

Developed and developing countries alike are rushing towards the adoption of ICT in order to participate and reap the potential benefits of the knowledge-based economy. The integration of ICT across the Jordanian educational system aims to ignite the transformation of the whole society for the new era. Furthermore, Jordan has had to respond to concerns and warnings that educational systems within the Middle East and North Africa (MENA) region were not preparing students for the knowledge economy (Akkari, 2004). The response took the form of educational initiatives and reform projects that aim to enhance the preparedness of Jordanian students for the knowledge society. However, there are complexities facing the Jordanian educational system during its integration of ICT for educational reform (See Figure 1.1):
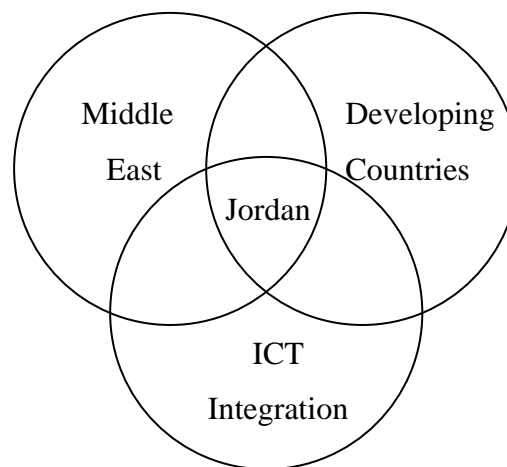
Figure 1.1:   Contexts associated with ICT integration in Jordan

Firstly, as Chapter 2 shall highlight, Jordan is a relatively poor country. Due to its scarce resources and fragile economy, Jordan relies on aid from other countries and international aid organisations for funding national reform projects. The educational system has undertaken several initiatives sponsored and funded by international partners such as the World Bank, United Nations Educational, Scientific, and Cultural

Organization (UNESCO), Japan International Cooperation Agency (JICA) and U.S. Agency for International Development (USAID). It is expected that these sources of funding can accelerate reform projects through providing the funds and expertise. However, it is conceivable that such external sources of funding are neither stable nor indefinite.

Secondly, the Middle East region is a turbulent region, frequently shaken by conflicts and wars. As Jordan is a small country located in the heart of the Middle East, this has severe implications nationally, whether due to disturbance such as an exodus of refugees seeking safety in Jordan, or the disturbance to external funds and thereby to educational initiatives.

Thirdly, ICT integration is characterised by additional complexity due to the diversity of factors that might contribute to the success or failure of integration. For Jordan, ICT integration is an expensive decision and it is expected to divert resources from other fields in the educational system. Integration starts by making this decision, and several other integral stages (e.g. implementation, adoption and institutionalisation) follow. Furthermore, ICT integration requires recurrent expenditure in order to safeguard access to ICT tools through maintenance, replacement and update of hardware and software as well as training.

1.3   Research Questions

This study investigated the Jordanian educational system's integration of ICT as part of the ERfKE reform project. The study investigates the complexity and the multilayered nature of the Jordanian education system and its impact on ICT integration. The research project conducts investigations at three levels of the education system - schools, regional directorates of education, and the Ministry of Education - in order to answer the question: How does the nature of the Jordanian education system influence schools' adoption of ICT for education reform?

Answering this question will be addressed through three clusters of questions:

The first group of questions centres around the role of schools in adopting ICT in relation to teachers and principals' experiences with and understanding of ICT integration. How do schools' leaderships influence the integration of ICT by school members? What experiences did teachers have during their utilisation of ICT? How prepared were classrooms and schools for the integration of ICT? How prepared were teachers in order to implement ICT in their teaching?

The second group of questions centres around the role of the directorates of education as the intermediate authority between the Ministry of Education and schools. What role did the regional directorates of education play in the diffusion of ICT in schools? To what extent did the directorates support or hinder schools' and teachers' adoption of ICT? How ready were the directorates in order to undertake the role of diffusing ICT across the educational system and to follow-up implementing decisions made by the Ministry of Education?

Finally, the third group of questions extended to the Ministry of Education level. What influenced the Ministry's decision to undertake ICT integration? How was the decision being executed by the concerned departments and directorates? What issues arose during the implementation the decision for the Ministry? How can the Ministry of Education strike balance between its attempt to reform the system and its dependence on external funds and expertise? What impact did the top-down mechanism of decision-making have on ICT integration?

1.4 Significance of the study

The study is important for several reasons.

Firstly, Jordan is located in the MENA region, and research has indicated that much professional research is needed to enable development and to support decision-makers in making informed decisions. Research in the region counts for one-tenth of one percent (0.01%) of the world's research and development spending, less than any other region excluding sub-Saharan Africa (Akkari, 2004). In Jordan, the Ministry of Education has pointed to its limited capacity to analyse and make use of data for decision-making (Ministry of Education, 2004). At the same time, Arab countries spend

more than five percent (5%) of their Gross National Product (GNP) on education which is the highest percentage among all countries (Akkari, 2004). Nonetheless, this spending has not created satisfactory education systems in the region by international standards (Billeh, 2002).

Secondly, this research project will contribute to the literature on ICT integration in the developing country context. ICT integration in educational systems is increasingly attracting research, however, this research is mainly conducted in or by developed countries with a slim share of research emerging from developing countries apart from that conducted in these countries by western experts or international organisations. Subhi (1999) reported that only a few studies had been conducted in the area of computers in Jordanian schooling. The modest contribution in scientific research by Jordan, as well as other developing countries, is interlinked to the relative novelty of this area of educational research and to directing efforts to the provision of ICT infrastructure, which had attracted the largest share of resources and attention.

Thirdly, this study will also provide a perspective on the ways in which decisions are made and disseminated across the Jordanian educational system. This will provide an insight on relationships existing between the several levels of the educational system during the implementation of decisions made at the Ministry level. This perspective will shed light on factors associated with both decision-making and its implementation across the several levels of the educational system.

Finally, as noted above, a great deal of research conducted about ICT integration in Jordan and other developing countries, is mainly conducted by international organisations relying on Western experts to conduct such research. Despite the great value of such research conducted by seasoned Western scholars (Kozma *et al.*, 2006; Kozma, 2006), there is a caution that this is still an 'outsider' perspective. Conceivably, any local context can conceal itself to the outsiders; a new culture, new relationships and local power structure can mislead outsiders in myriad ways. Therefore being a Jordanian myself, and a former teacher in the Jordanian educational system and as a Jordanian helped me to touch certain issues that might be elusive to outsiders.

1.5 Addressing the Research Questions

I entered this research study with a basic belief that ICT can improve teaching and learning when it is properly integrated. My interest and passion led me to study the Jordanian education system where I had served as a teacher.

The review of the literature helped me to identify several key factors that might hinder or support the integration of ICT across educational systems. However, due to the slim share of published research from Jordan, which, as noted above, is generally the case for developing countries, I had to review literature on ICT integration which came mainly from developed countries, especially those in North America and Western Europe. My questions and concerns about the ways in which ICT would be integrated in Jordan, considering the country's contextual factors, led me to a range of interdisciplinary studies including studies of educational reform, ICT in education, development and post-colonialism. These areas of study offered considerable scholarly analysis of ICT integration within the Jordanian educational system. As I will detail in Chapter 4, I designed the study in two phases. During Phase1, I conducted two questionnaires in order to provide an overview of the educational system's integration of ICT. The sample was systematically selected through the stratification of the system and targeting twelve particular schools in the three regions of Jordan, North, Middle and South, as well as particular school members in the selected schools.

Preliminary analysis of the two questionnaires guided the study by pointing to a group of schools which could serve in the study as critical cases; if ICT integration cannot make it there it would be unlikely to make it anywhere else in the country. The two case studies in Phase2 aimed to further investigate the key factors identified in the literature, while being open and tentative to new factors as they emerged during my extended and close engagement with school members. During this phase, I observed, interviewed and contacted selected participants from two schools.

However, the investigation in schools made it clear that in order to make sense of schools' integration of ICT it is important to study them in the context of the larger educational system in which they operate. This led me to extend the investigation to include the diffusion of ICT across the several levels of the educational system.

1.6 Overview of Chapters

Chapter 1 has presented an overview of the study, mapping its aims, purpose and methods. Chapter 2 moves to explore the context of Jordan, which will lay the ground for a better understanding of the local context. This stems from my realisation that the educational system is highly influenced by and bears the hallmarks of the local context.

In order to place this project in wider and richer context, Chapter 3 will draw upon global experiences of educational change and the integration of ICT. The review of the literature will start by engaging with discourse relating to the transformation of society, the emerging demands and skills for the knowledge-based society, and the pressing needs for educational changes that embrace ICT. Chapter 3 will also examine educational change and the diffusion of innovations across educational systems in order to improve educational outcomes. This chapter then moves to discuss the ultimate goal of ICT integration across educational systems as the adoption is perceived by schools and is implemented in classrooms.

Having projected the research problem and reviewed the literature, in Chapter 4, I present the methodology and research methods for this study, the measures taken to increase research rigour, and the analysis utilised in this study are also discussed in this chapter.

The thesis then progresses to present the findings of the study. Chapter 5 will present findings from Phase1: the two questionnaires conducted in the three regions of Jordan. This will serve as an overview of the Jordanian context of ICT integration across the system. It will also present findings related to the existence of certain factors identified in the literature as key factors for ICT integration across the Jordanian educational system. In addition, this overview will establish the basis for Phase2, the systematic selection of two schools as case studies for in-depth investigation.

Chapters 6 and 7 will present findings from Phase2, the two case studies. Chapter 6 will present factors associated with ICT integration at the school level as they emerged from

the two studied schools. This chapter will investigate in-depth the previous factors outlined in Chapter 5. In addition, this chapter will represent factors which emerged from the two schools and which might have been overlooked or underestimated in previous literature. Chapter 7 will present factors which emerged beyond the two schools and which were associated with the role of the Ministry of Education and the regional directorates of education in the integration of ICT.

Chapter 8 interprets and integrates findings from the questionnaires and case studies presented in Phase1 and Phase2 of the study. This chapter will pull together the findings presented in Chapters 5, 6 and 7 and link them to the larger literature on ICT integration. The first section of this chapter will present issues associated with the school context in its adoption of ICT. The second section discusses the role of the intermediate authority in the integration of ICT across the educational system. The third section will discuss issues which arose at the Ministry of Education level.

In conclusion to the thesis, Chapter 9 reviews the major findings of the study. It crosscuts the three levels of the educational system in order to analyse how the decision to integrate ICT is made, implemented and followed through. Finally, the implications of this study and suggestions for future directions for research are presented.

1.7 Summary

ICT is a relatively new component in education in Jordan as well as in educational systems in the rest of the world. While there is a growing consensus that ICT can improve education when it is properly integrated, the literature has not settled upon effective approaches for achieving successful integration. The Jordanian educational system has adopted several educational initiatives aiming at improving the system's, and eventually the country's, preparedness for the knowledge-based economy. As shall be highlighted in Chapters 2 and 3, there is an embedded complexity involved with ICT integration across educational systems, and this complexity is more severe for the Jordanian educational system due to economic, contextual as well as educational factors.

Chapter 1 has presented a brief overview of the study and I now move to present each of the chapters identified in section 1.5 above, commencing with the context of ICT in the Jordanian education system in Chapter 2.

Chapter 2

The Educational Context of ICT in Jordan

In this chapter I present the context of ICT integration in the Jordanian Educational system. I commence by situating the study within the socio-political context of Jordan. I will provide background information about Jordan, its history, location, economy, population and ICT access. Then I will map the educational system which is located within that context, and outline the system's attempt to introduce ICT in schools.

2.1 Jordan: Background

2.1.1 Location and Economy

Jordan is formally called the Hashemite Kingdom of Jordan. The country was part of several ancient civilizations of Europe and the Middle East, including the Greek, Roman, and Islamic empires. As a modern state, Jordan was established in 1921 under the rule of Emir (prince) Abdullah who established the first centralised governmental system, which included what used to be called the Emirate of Transjordan. Jordan occupies the eastern bank of the Jordan River and is bounded to the north by Syria, to the east by Iraq, to the southeast and south by Saudi Arabia, and to the west by Palestine and Israel (See Figure 2.1).
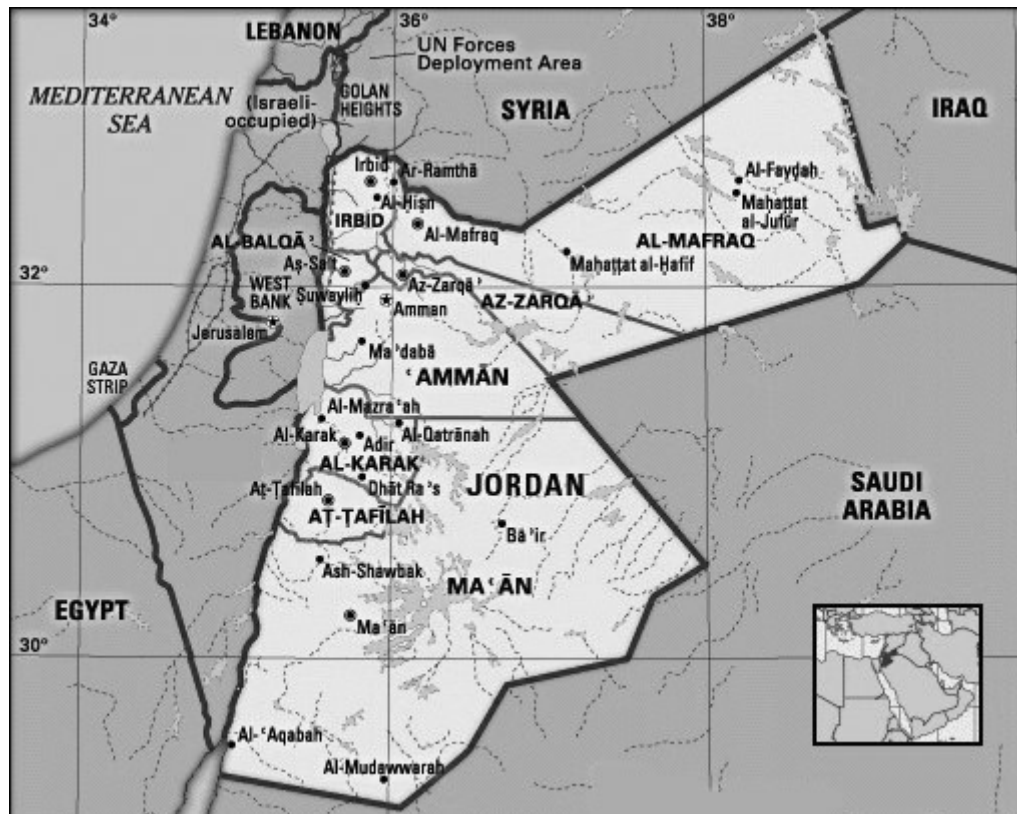
Figure 2.1: Map of Jordan

Throughout history, Jordan has been a crossroads connecting Asia, Africa, and Europe. This has benefited Jordan as a conduit for trade and communication, but this strategic location has had also its downside, especially in turbulent times (see section 1.2 below).

The desert occupies four-fifth of Jordan's territory, especially in the eastern and the southern parts of the country. In addition, Jordan has only sixteen miles (26 km) of coastline along the Red Sea. The country is one of the ten poorest in the world in its water resources (Jaber *et al.*, 2001) and water shortage is becoming one of the country's crucial problems (Ministry of Education, 2004).

Jordan is surrounded by oil-rich neighbouring countries; however, its oil resources are minimal with minerals (e.g. phosphates, potash, limestone, and marble) being the country's major natural resource. Mineral resources such as phosphate, petroleum refining, and cement production are the country's major heavy industries. Because of its poor natural resources, Jordan relies to a great extent on its human resources (see section 2.1.2 below). Remittances from the Jordanian workforce abroad, including teachers working in neighbouring countries, are major sources of foreign exchange

(Emaduldeen, 2007). In addition, the workforce abroad has helped greatly in reducing unemployment, as the large numbers of Jordanians working in other countries ease the pressure on the local market. However, this can create other problems by losing skilled labour to these countries, as well as being vulnerable to the regional market, which has been rocked by a sequence of conflicts and crises. Despite some economic growth since late 1990s, with more than 4% growth between 2000 and 2002 compared to 1% between 1996 and 1998, the country's capacity for growth remains fragile, with 10% fiscal deficit in 2003 (World Bank, 2003b). Most recently, a sharp increase in the oil prices, due to the invasion of Iraq and its consequences, has had its severe consequences on the Jordanian economy, as Jordan used to receive oil from Iraq at reduced prices. Resources which had been allocated for development projects were diverted in order to cover the sharp increase of oil prices. According to the Jordanian Prime Minister, Adnan Badran, "the government subsidy [for oil] increased in 2005 by 78% which reduced resources for infrastructure, health and education" (Cited in: AlNemri, 2005).

Often, such changes and instability in the region's markets has impact on the performance of the educational system. The sharp increase in demand for particular subject teachers by neighbouring countries creates pressure on the Jordanian educational system so that it has difficulty in fulfilling vacant positions with qualified teachers. Thus, there appears to be a tension between, on one hand, the need for experienced teachers locally, and on the other, the financial need for remittances from work abroad.

2.1.2 The increase in population: The influxes of refugees

The population of Jordan is predominantly young. People under the age of fifteen constitute the largest component of the population with a percentage of 38% (Ministry of Education, 2004). The population's average annual growth is estimated to have been as high as 3.2% between 1994 and 2002 (Ministry of Education, 2004). In addition, the three regions of Jordan - Central, North, and South - are greatly different in density of population. The Central and Northern regions are the most populated as 62.83% of the population reside in the former and 27.79% in the latter, while only 9.31% in the Southern region although it comprises 51.2% of Jordan's land (Department of Statistics, 2005). Internal migration from rural to urban areas is also considered to be a burden on

the economy with 80% of the population now living in urban areas (Emaduldeen, 2007) and 38.8% by the total population living in Amman, the capital (Department of Statistics, 2005).

Moreover, the impact of refugees has been acute, altering not only Jordan's demographic map but also its political, social, and economic conditions. Going back to the 1948 Israeli-Arab war, 750,000 Palestinians were expelled (Falah, 1996) by the newly formed Israeli state, about half a million of whom sought refuge in Jordan. An influx of Palestinian refugees continued after that time until the 1967 Israeli-Arab war when an estimated number of 310,000 to 350,000 Palestinians were expelled and made their way to Jordan (Khawaja, 2003).

The growth of population has continued to pose a major challenge to Jordan, as a country in general and to the educational system in particular. Frequently, the Jordanian government has voiced concern about the pressure of the refugees issue on the country's limited resources and in particular on its health-care and educational systems (Gavlak, 2007). In the wake of the first Gulf war in 1990-1991, an estimated one million people arrived in Jordan voluntarily or as a result of displacement from countries on each side of the conflict (Hear, 1995). It was estimated that 300,000 of those refugees were Palestinians from the Gulf states (Hear, 1995; Seijaparova *et al.*, 2004). As a result of a mass influx of refugees and displacement policies, the population of Jordan increased from 2.8 million in 1987 to 4.2 million in 1995; an average annual rate of 5.5% (Talal, 1998).

These changes dealt another blow to the country's plans for reform. The refugee dilemma often caused sharp rises in inflation and real estate prices (Gavlak, 2007), and its wider and more severe consequences often can be felt in Jordan as a small country already encountering serious economic problems (Chatelard, 2004). According to Seijaparova and Pellekaan (2004), as a consequence of the 1990-1991 crisis, poverty rose sharply from 3% in 1987 to 14% in 1992. In 2007, as a consequence of the 2003 Gulf war and the consequences of the American-led invasion of Iraq, 750,000 Iraqis were estimated to be residing in Jordan (Gavlak, 2007) of whom 60,000 were school-aged children (Ministry sources and interviews). According to the most recent report

(Department of Statistics, 2007), the population is currently estimated to be 5.64 million.

The sudden or unexpected arrival of large numbers of refugee students in Jordan will necessary impact upon existing plans, and strategies and resources will be re-directed to where they are most needed. The Ministry of Education of necessity bears the brunt of such sudden turbulences, and the Ministry always tries to accommodate the newcomers by providing them at least with an adequate physical environment for their education, such provision will be at the cost of educational reform initiatives.

2.1.3   Access to ICT in Jordan

Jordan has joined other countries in their race to adopt ICT as a vehicle for preparing and transforming societies for the knowledge economy. Due to the increasing awareness of ICT as a catalyst for economic prosperity and development, the IT sector registered the most rapid growth of any sector since 2000 in Jordan (Ministry of Information and Communications Technology, 2005).

Several national initiatives were launched by the Jordanian government with the aim of infusing ICT within society at large. REACH initiatives (1, 2, and 3) intended to improve the competitiveness of IT industries and to improve the environment for IT industry growth. In addition, the Ministry of ICT launched the *Connecting Jordanians Initiative* (CJI), which paved the way for establishing *Jordan Information Technology Community Centers* (JITCC) as part of a national strategy to get Jordanians online (United Nations Economic and Social Commission for Western Asia, 2005). Furthermore, the Ministry of ICT implemented what was called the "e-Government initiative". As part of this initiative, 20,000 government employees across the Kingdom were scheduled to receive training to make them ICT-literate by the year 2005 (Information Technology Association, 2003). In 2006, a national ICT Research and Development Strategy was launched in order to guide ICT sector development in Jordan between 2007-2009 (Ministry of Information and Communications Technology, 2006).

The international private sector was also invited to participate in infusing ICT in society at large. In 2004, Intel opened its first Computer clubhouse in Jordan aiming at

supporting young people aged 10-18 by providing them with access to high-tech equipment, professional software and training (Intel Corporation, 2004).

In 2002, McConnell International, funded by the USAID, conducted an assessment of Jordan's *E-readiness* in five areas: connectivity, leadership, information security, human capital, and e-business climate. The report concluded that while Jordan has a strong leadership commitment to ICT which made it one of the highest national priorities, the two areas of connectivity and e-business climate needed substantial improvement. This was also illustrated in an International Telecommunication Union (2003) report, which indicated that while *knowledge* of ICT scored high in Jordan, both infrastructure and access remained poor. In addition, despite attempts made by the government to encourage access to ICT and the use of Internet, connectivity prices remained *prohibitively* high (The Arabic Network for Human Rights Information, 2004) in relation to average income per capita. However, there has been a remarkable role played by a large number of Internet Cafes where access to the Internet is available at relatively minimal fees (Information Technology Association, 2003). In 2003-2004, a World Economic Forum report indicated that Jordan ranked 46 among 102 countries worldwide in its networked readiness (Dutta *et al.*, 2004). Most recently, an ITU/UNCTAD (2007) report, showed that Jordan ranked 79 among 181 countries worldwide in 2005/2006 on the *Digital Opportunity Index;* a tool designed for tracking progress in bridging the digital divide.

2.2 Education in Jordan

2.2.1   Overview

Before Jordan attained independence, in 1946, education was available only to people who were able to afford it. After independence, the 1950s period witnessed a shift towards *education for all* which was reinforced by the *Knowledge Act No.20* which made education compulsory for all children up to grade six. In order to further extend educational provision across the country, Parliament passed the 1964 *Education Act No.16,* which made education compulsory up to grade nine. In 1967, following the Israeli occupation of the West Bank, efforts turned to finding ways to accommodate the influx of migrant and refugee children by expanding the educational system. Then, in

the 1970s and 80s, the focus of reform shifted from expanding the educational system to improving the quality of education delivery.

Attending school now is compulsory in Jordan for basic education, which is undertaken from the age of 6 to 16. Secondary education is composed of two years of either comprehensive or vocational education. In order to attend tertiary education, students are required to undertake the General Secondary Education Certificate Examination *(Tawjihi).* The school year has 193 working days divided into two semesters and runs from August to June (Ministry of Education, 2005b).

The educational system is highly centralised. The Ministry of Education and its departments are located in Amman, the capital, and are represented by 36 regional directorates of education across the country. The curriculum for each subject is detailed by grade level in a formal document issued by the Ministry of Education; it is then translated into curriculum materials which teachers use for planning their instruction. In addition, teachers are usually trained to use the curriculum in order to insure their faithful implementation of the materials (Hasan, 2000). The curriculum tends to focus on transmitting organized bodies of knowledge to students with little concern for their relevance to students' concerns and contemporary life (Hasan, 2000).

Reports from the Ministry of Education (2004) and the World Bank (2003b) indicate that 20% of Jordanian students are studying in structurally unsafe and overcrowded schools. A large percentage of schools are operating over capacity in urban areas but under capacity in rural areas. A World Bank (2003b) report indicates that 39% of the Ministry-owned schools were overcrowded and 75% of rented schools are "extremely inadequate and structurally unsafe" (p.39).

According to the statistics of the school year 2005/2006, there were 3126 governmental schools with 1,056,470 students and 58,886 teachers in Jordan (Ministry of Education, 2007). In addition, the literacy gap between males and females has been significantly bridged. The 2003/2004 academic year statistics showed that 51% of students were males and 49% were females (Ministry of Education, 2004). In addition, the enrolment in basic education was 94.1% among females compared with 93.8% among males.

Females' enrolment in secondary education was also similar to that of males, with 75.67% enrolment among the former and a 75.61% enrolment among the latter.

The opening of new schools in rural areas has caused a decline in student-to-teacher ratio. However, as noted above, this development has not diminished the problem of high student/teacher ratios in urban areas. In 1991, about 46% of public schools enrolled no more than 200 students (World Bank, 1999) and a large proportion of the schools were small in size (300-400 students) which sharply increases the spending despite the decline in students-to-teacher ratio (2003c). A World Bank (1999) report suggested that there is room for greater internal efficiency within education systems in the MENA region as a whole. Despite differences between systems in the region, they are characterised by spending a high percentage of their budget allocation on salaries of more teachers (World Bank, 1999). It is estimated that 90% of basic and secondary education recurrent expenditure is spent on personnel costs, and the wage bill is estimated as high as 11% of total government spending (World Bank, 2003b).

2.2.2   The Role of the Regional Directorates of Education

As noted above, the Jordanian educational system is highly centralised, with the Ministry of Education being represented by regional directorates of education which are the intermediate authority between it and schools (Figure 2.2). The regional directorates of education have the role of disseminating policy statements and initiatives from the upper levels of the educational system to individual schools. In addition, they oversee the performance and practices of schools.
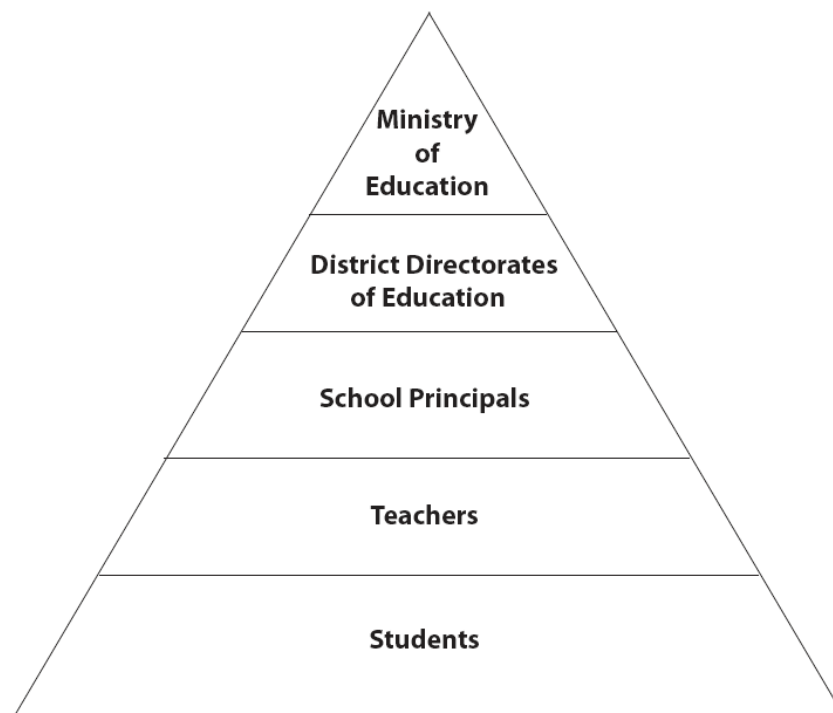
Figure 2.2:   The Current Hierarchical Pyramid of the MOE (Adapted from: Mu'tamen, 2002, p.27)

Each directorate has a mentoring department which is responsible for follow up at both school and classroom levels, as well as for evaluating the performance of schools and teachers. Subject mentors are assigned to oversee and evaluate a number of teachers in several schools and to provide them with assistance, support and follow-up. The visits could be evaluative or supportive for teachers, as each mentor is required to write a report about each teacher's performance by the end of the schooling year, and this report forms part of the overall assessment of teachers' professional performance which has implications for teachers' ranking. In addition, mentors may conduct workshops for teachers when needed, as they are required to support teachers to improve their performance (Ministry of Education, 2005a). Practically, subject mentors provide a direct link between the educational system outside school walls and educational practices performed in schools and classrooms by school members.

2.2.3   Educational Reform in Jordan

During the last two decades there has been an increasing awareness of the need for ICT to be integrated into the education system. In the school year 1984/1985, computers

were first introduced on an experimental basis to a limited number of secondary schools, in order to teach the subject of computing. According to Tawalbeh (2001), the aim of the experiment at that stage was to familiarise students with:

a) computers and their role in the society
b) the components of computers and their functions
c) databases and data processing
d) BASIC programming

In 1987, the *National Conference for Educational Development* was held, which became a milestone for educational reform. According to Jaradat (1992), the conference confirmed the Kingdom's commitment to preparing learners for the future by providing them with the skills which they need in order to be lifelong learners. In particular, the conference highlighted the need for integrating computers across the education system, which resulted in the Ministry making funds available for schools to buy audiovisual products and hardware (Jaradat, 1992).

However, there had been no clear vision about integrating computers and related technologies within the educational system until the year 1988, when the Directorate of Educational Computing was established. The goal now shifted to creating better awareness of computers by exposing students to programmes such as word processing software and spreadsheets. Tawalbeh (2001) stated that during this stage, the Ministry of Education was aware of the potential benefits of Computer-Assisted Learning (CAL) in schools, however, the lack of equipment, the high cost involved, and the lack of trained teachers were obstacles to implementation. Initiatives at that stage were primarily focused on providing schools with computers, and minimal attention was paid to upgrading or maintaining machines in schools.

According to Jaradat (1992), the integration of computers into the educational system during that period targeted two main areas:

- Improving access to technologies at the several levels of the educational system including the Ministry of Education, the regional directorates of education, and governmental schools.

- Developing a national implementation plan for integrating computers within educational settings, based on a clear educational philosophy and which would a) introduce computers as learning aids in all stages of schooling; and b) specify the skills required by students to ensure maximum benefit from the innovation.

The unexpected mass return of Jordanians after the 1990-1991 Gulf War as well as a new wave of refugees (Hear, 1995; Seijaparova *et al.*, 2004), had an impact on these plans because significant resources were redirected to accommodate the unexpected and sudden increase in student numbers. Therefore, according to Hasan (2000), reform during that phase fell short of its rhetoric in regard to staff and curriculum, as well as its aim to reshape teaching and learning to become student-centred, which was not actualised in practice.

Moreover, with the aim of improving the quality of teaching and learning, in 1994 the Ministry of Education passed the *Education Act No.3,* which required 67 percent of teachers who held two-year community college degree (Ministry of Education, 1994), to upgrade their degree to a four-year university degree (Ahlawat *et al.*, 1996; Ministry of Education, 2001b). However, a World Bank (2003b) report indicated that this attempt proved to be ineffective in transforming teaching and learning, as teaching methodologies remained the same despite successful upgrading of teachers' own education levels.

In the early 1990s, UNICEF offered the Ministry of Education a project called the Global Education Programme (GEP). The programme started during the academic year 1992/1993 and aimed to improve students' awareness and respect for their "political, economic, social, and cultural situation, unleashing their vision, creativity; and developing their skills and strategies for thinking, believing and acting" (Hasan, 2000, p.98).

The World Bank has been a major partner with the educational system in its reform projects since 1980s, in particular, with the First Human Resources Development Sector Investment Loan (HRDSIL I), and the Second Human Resources Development Sector Project (HRDSIL II) (World Bank, 2000). HRDSIL I was implemented between 1990

and 1995, while HRDSIL II followed on until 2000. These projects aimed to (a) restructure the school system; (b) improve the quality of teaching and learning; (c) use sector resources more efficiently and increase cost recovery levels; and (d) institutionalise the capacity to sustain sectoral reform (El-Berr, 2004).

Despite the "satisfactory" overall assessment of HRDSIL I and HRDSIL II, the programme's *Completion Report* reported a two and half year delay in implementation (World Bank, 2003a). The report found that delay was caused by changes in policy-makers, re-organisation of the Ministry of Education, and hesitation on the part of the Government of Jordan to commence civil works. The report also indicated that the design was sound, but identified a number of weaknesses in implementation: (i) programme objectives lacked clarity; (ii) some courses and materials were poorly related to training needs; (iii) many trainers needed training; (iv) training venues were poorly equipped; (v) other duties prevented participants from taking full advantage of courses; and (vi) programme coordination between the Ministry and universities "was not good" (World Bank, 2003a)

The turning of the 21st century has witnessed increasing and pressing needs for integrating ICT across the educational system, and the Ministry of Education has responded accordingly. Firstly, the Ministry's commitment to ICT integration has taken the form of improving the ratio of students to computers to 8/1 (Heresh *et al.*, 2002; World Bank, 2003b), as well as connecting schools countrywide to the Internet and intranet. In the academic year 2002-2003, the Ministry, through the Administration of Curricula and School Textbooks, started preparing new curricula in which ICT is integrated and new software for the school subjects of Arabic and English (Ministry of Education, 2004). Furthermore, the Ministry has aimed to provide multiple resources and technological competencies that education extends from textbooks to e-learning (World Bank, 2003b). In fact, by 2008 all subjects are planned to be digitised with multi-media contents, and to be used by all schools (Ministry of Education, 2002b).

The Ministry has also introduced ICT professional development courses in order to assist its staff members to perform in a new educational context where ICT is a major component of teaching and learning. Teachers were expected to receive training on the new national curriculum and to be using different delivery methods by the year 2006.

According to the Ministry of Education (2002b), this training is to be provided through coordination between the Ministry of Education and the Ministry of Higher Education and Scientific Research (MHESR) on one hand, and the private sector and universities on the other hand.

2.2.4 Bitter findings: Education systems falling through the net

The MENA region is often studied by international organizations and development agencies such as the World Bank and UNESCO. Countries in the region, especially non-oil countries, like Jordan, are characterised as developing countries, which rely heavily in their development projects on aid from other countries and international aid agencies in the form of funding and expertise.

Studies have indicated that education systems in the region spend a significant percentage of their gross national product (GNP) on education. According to Akkari (2004), Arab countries spend over 5 percent of their GNP on education, the highest percentage among all developing countries. Jordan spent 6% of its gross domestic product (GDP) on education in the mid 1990s and 17% of total government expenditure (Ministry of Education, 2006). The latest figures from the Ministry of Education indicate that in 2006, spending on education was 4.1% of the country's GDP and 12% of the total government budget (Ministry of Education, 2006). Nevertheless, studies and reports have cautioned that despite impressive signs of improving education in term of enrolment and access to public education, *quality* is still a concern. It has been widely reported that educational systems in the MENA region are not preparing students to participate in the global market or the workplace after completing their secondary education (Akkari, 2004; Ministry of Education, 2004; World Bank, 2002; World Bank, 2003).

For example, the Third International Mathematics and Science Study (TIMSS) is an international test of students' acquisition in mathematics and science according to international standards. The test was conducted in 1999, and Jordan, Tunisia and Morocco participated from the MENA region. The results of the test showed that Jordan was *near the bottom in math and science* compared with other participating countries (World Bank, 1999, p.12). However, the 2003 TIMSS test showed a significant increase

in students' average achievement in science for eighth-graders, along with a slight decline of eighth-graders' average achievement in Mathematics (National Centre for Education Statistics, 2003). Furthermore, the *Programme for International Student Assessment* (PISA) report assessed the performance of 400,000 students from 57 countries worldwide. The report found out that Jordan was "statistically significantly below the OECD average" (OECD, 2006, p.22) on its science scale. Moreover, a national assessment in Jordan found that students did not meet the educational systems in learning objectives in Arabic, math and science (World Bank, 1999).

Furthermore, education systems in the region are often managed by at least three ministries, where coordination is limited (World Bank, 1999). For example, in Jordan, universities, which are under the jurisdiction of the Ministry of Higher Education and Scientific Research, are the main providers of teacher education, while basic and secondary education are under the jurisdiction of the Ministry of Education. Although the Ministry of Education had a general agreement with universities about the need to coordinate more closely in order to respond to the rapidly changing labor market, there was no actual mechanism to facilitate this coordination, which has created confusion and mismatch between pre and in-service teacher education and teachers' practices (World Bank, 2003c). In addition, the three-year applied vocational education which follows year 10 is overseen by the Ministry of Labour, and graduates in vocational education cannot apply for university education (Al-Sa'd, 2007).

Human capital represents Jordan's main asset. The country has kept its advantage in the regional market with the highest literacy rate in the region and with high demand for its workforces within the regional markets. However, there have been radical changes in both regional global markets with a growing for graduates who are ICT literate. Therefore, the country would have to strive to keep the demand for its workforce and not to lose this asset to other competitors in the region by hesitating over a decision for ICT integration (Ministry sources and interviews).

Changes driven by the pervasiveness of ICT and the transformation of societies towards the information era have implications for the skills required for people to be able to participate in and benefit from the knowledge-based economy. Internationally, graduates are now expected to master a range of 21st century skills including problem-

solving, teamwork, communication, IT, critical and analytical skills (European Commission, 2002).

2.2.5 The Ministry's response to the concerns

As indicated previously, the Jordanian education system has engaged with several reform projects over the last few decades aiming to improve its performance. However, the turning to the 21st century has added new and additional factors to be considered while conducting educational reform, in particular, the pervasive and increasing role of ICT in societies at large. In addition, concerns about the performance of educational systems in the MENA region have added to the demand for radical changes in educational practices.

Until recently, the focus of reform was on providing schools with computers, while other key components of ICT integration were overlooked, such as professional development, curricula, and access to ICT. That is, teachers did not receive professional development relating to ICT on how to integrate ICT into their teaching. The only professional development made available for teachers was that noted above - the degree upgrade where teachers with two-year college degree were required to upgrade to a university degree. However, as noted earlier, a World Bank (2003b) report claimed that this attempt proved to be ineffective: the curricula remained teacher-focused, and computer related activities remained minimal apart from the teaching of computers as a subject. In addition, the focus remained on quantitative indicators, with less attention paid to quality and utilisation. Indeed, it may be said that the focus was on providing schools with computers even if these computers ended up in locked computer labs. In addition, according to Hasan (2000), classrooms were becoming intellectually un-stimulating places where students' voices were rarely heard.

The most recent responses from the educational system to these concerns came in the form of two major initiatives:

    (a)   Education Reform for the Knowledge Economy (ERfKE)
    (b)   Jordan Education Initiative (JEI)

These two initiatives are outlined below.

2.2.5.1   *Education Reform for the Knowledge Economy*

In 2003, the Ministry of Education launched an ambitious large-scale educational reform under the name of Education Reform for the Knowledge Economy (ERfKE). The initiative is the largest reform project ever funded by the World Bank (Cisco Learning Institute, 2004). The aim of the project was to create a comprehensive transformation of the educational system in order to equip students with knowledge, skills, attitudes, and competences required for the knowledge-based economy (National Center for Human Resources Development, 2005).

The ERfKE project comprised four components:

COMPONENT 1: reorienting education policy objectives and strategy through governance and administrative reform. This component comprises five sub-components:

a)   Redefine vision and create a comprehensive national strategy for education;

b)   Improve governance, management and decision-making processes;

c)   Integrate an education decision support system;

d)   Conduct educational research and policy analysis, monitoring and evaluation;

e)   Develop effective management and efficient coordination of investments.

COMPONENT 2: Transforming education programmes and practices for the knowledge economy. This component comprises three sub-components:

a)   Prepare curriculum and assessments for the knowledge economy;

b)   Provide professional development for Ministry of Education; personnel;

c)   Provide required resources to support effective learning.

COMPONENT 3: supporting provision of quality physical learning environments. This includes two sub-components:

a)   Replace structurally unsafe and overcrowded schools;

b)   Upgrade existing schools to support learning in the knowledge economy.

COMPONENT 4: promoting readiness for learning through Early Childhood Education. There are four sub-components:

a)   Build institutional capacity;

b)   Provide professional development of early childhood educators;

c)   Increase access to Kindergartens for the poor;

d)   Promote parent and community participation in Early Childhood Education.

Teacher's role in ERfKE

The ERfKE project also paid attention to teachers and to their crucial role in achieving effective learning outcomes for the knowledge-based economy. In this regard, the Ministry of Education identified new roles and practices for teachers:

- Implementing curricula independent of textbooks;
- Organising educational experiences in a school environment which lead to desired outcomes;
- Developing and employing a range of strategies in the teaching process;
- Facilitating access to knowledge from different learning sources;
- Motivating learners to learn and create;
- Evaluating learners' achievement to improve their performance.

The ERfKE reform project highlighted the importance of continuous professional development to enable teachers to utilise ICT in their instruction (Ministry of Education, 2004). The Ministry of Education identified two main approaches for staff professional development: (i) in-service training - offered through regularly scheduled workshops and summer institutes immediately preceding the implementation of the new curriculum; and (ii) on-service training - provided through teams of "Mentor Teachers" which is "dedicated to working throughout the school year directly with teachers, supervisors and principals in the schools where and while new curriculum is being introduced." (World Bank, 2003b, p.38)

Accordingly, the Ministry adopted several programmes for in-service teacher training, which are directed at three types of proficiency: ICT skills, pedagogical skills, and curriculum training (Alutaibi, 2003). Four main ICT professional development programmes were adopted:

- *The International Computer Driving License* (ICDL). The programme covers basic IT literacy (UNESCO, 2004); all Jordanian teachers were expected to undertake the course by the year 2005;
- *International Education and Resource Network* (iEARN). This represents a form of Global Education which encourages teachers and young people from countries worldwide to work together online, using the Internet and other new communications technologies (iEARN, 2004);
- *Intel Teach to the Future* professional development programme which aims to train teachers and students to use technology effectively in the classroom (Intel Corporation, 2005; Ministry of Education, 2002a);
- World Links course which aims to better prepare students, teachers and the educational system to enter the information age through providing schools and teachers with skills and educational resources to harness ICT (World Links, 2002).

Furthermore, there were other courses offered to teachers on a small-scale, such as the High Diploma of ICT in Education provided by CADER.

Implementation and financing ERfKE

The timeframe for the implementation phase of ERfKE was five years between 2003 and 2008 (See Table 2.1). The curricula were expected to cover 50% of subjects by 2006, and 100% by 2008 (World Bank, 2003b), with 50% of teachers utilizing an e-learning enhanced curriculum by 2006, and 100% by 2008. In addition, the ratio of students to computers was expected to decrease to 8/1 by 2005. Moreover, all schools were expected to receive Broad Band connectivity by 2005 (Information Technology Association, 2003). By the academic year 2006-2007, curriculum reform was expected to be completed. Training on the new curriculum was to be completed by the year 2007, and broadband connectivity to be available in all schools by the same year.

Nevertheless, as indicated earlier, the launch and implementation phase of the programmes experienced some delay. In Chapter 7, I will document further the several impediments to implementation, which included delays in the deployment of ICT into schools and the authoring and development of new curricula and e-contents.

	Resources to Support Learning	Curricula and Learning Assessment Development	Professional Development and Training
2003-2004	- Connecting all secondary & some basic schools by Intranet - Computer Labs in all schools	Curriculum reform Grades: 9,10 & some 11,12 & MIS stream	Training of teachers (Grades: 9,10 & some 11,12 & MIS stream)
2004-2005	- Connecting all schools by Intranet - Computer equipment to meet ratio 1:8	Curriculum reform for Grades: 7,8 & some 11,12 & academic stream	Training of teachers of Grades: 7,8 & some 11,12 & academic stream
2005-2006	- Computer equipment to meet ratio 1:8 - Broadband Connectivity	Curriculum reform Grades:4,5,6 & scientific stream	Training of teachers Grades: 4,5,6 & scientific stream
2006-2007	Broadband Connectivity	Curriculum reform Grades: 1,2,3 & vocational stream	Training of teachers Grades:1,2,3 & vocational stream

Table 2.1:   The Implementation Phase of ERfKE. (Source: Alutaibi, 2003)

Resources for financing ERfKE were secured through partnership between the government of Jordan and international aid agencies. The contribution of these international partners was substantial, with the World Bank alone providing 32% of total spending on the project, and the government of Jordan sharing constituting 35% (See Table 2.2).

	2003	2004	2005	2006	2007	2008	Total
Total Financing Required US$m							
Investment Costs	17	60	84	81	74	36	352
Recurrent Costs	0	1	2	4	7	3	17
Total Program Costs	17	61	86	85	81	39	369
Front-end Fee	1	0	0	0	0	0	1
Total Financing	18	61	86	85	81	40	370
Total Financing Sources US$m							
							Total
IBRD	5	20	30	28	27	10	120
Government	13	41	24	22	20	10	130
Others	-	-	32	35	34	19	120
Total Program Financing	18	61	86	85	81	39	370

Table 2.2:   Proposed Education Spending Under ERfKE (US$), (Source: World Bank, 2003b, p.45). (IBRD = International Bank for Reconstruction and Development, the World Bank)

2.2.5.2   *JEI and the Discovery Schools*

The launch of ERfKE in 2003 was followed in the same year by the Jordan Education Initiative (JEI). The JEI provides ERfKE with a rapid prototype model for discovering best practices and lessons learned in the implementation of ERfKE (McKinsey & Company, 2005). The JEI initiative functioned as an "accelerator" for ERfKE by concentrating on the performance of Discovery Schools before ideas and programmes were to be rolled out nationally under the ERfKE project. In the period of this study, all 100 selected Discovery Schools were located in Amman and they included 50,000 students and 2,300 teachers. These schools also had a long history of pioneering reform projects and initiatives. Accordingly, Discovery Schools had the optimal conditions for ICT integration and could showcase *best practices* for other schools.

The objectives of the JEI were organised in three main tracks:

Track 1:   New approaches to learning and teaching.

Track 2:   Lifelong Learning.

Track 3:   ICT industry Development.

Track 1, which is the focus of the present study, incorporated three sub-tracks which focused on ICT integration in schools through:

1) Track 1a: In-classroom Technology. Teachers in Discovery Schools were expected to receive training and tools to integrate ICT into everyday classroom teaching. This took the form of distributing laptops and projectors to teachers. Specialist "math labs" were also being introduced to all the Discovery Schools and computers were to be connected to a national intranet as well as to be supplied with wireless technology (Cisco Learning Institute, 2004).

2) Track 1b: e-Curricula development. This was the fastest track of all, and showed remarkable achievements. It aimed at developing rich digital content in new outcomes-based curricula from Grades 1-12 in multiple subjects (McKinsey & Company, 2005, p.8). during the course of the present study, grades 1, 4, 8, and 10 had received new textbooks for all subjects and E-math was ready for all grades. Four other subjects (Arabic, Computer, English and Science) were being developed for all grades. ICT was to be integrated as an integral part of the new curricula by incorporating activities that can be done only through ICT (Ministry sources and interviews).

3) Track 1c: Training. This aimed to develop and provide ICT professional development covering basic ICT skills, pedagogical use of ICT, adoption of new e-Curricula, and change management and leadership.

However, as I will further explain in Chapters 6 and 7, due to the complexity of implementation and a shortage of resources, deployment was slower than expected. According to McKinsey and Company (2005), in the In-Classroom Technology sub-track, only 13 schools had received Math labs equipment, laptops, projectors, wireless devices and connectivity. In 37 schools, Math labs were in place, although they were not all fully operational.

2.2.6 The involvement of "others" in financing education

The high cost of educational provision, scarcity of resources, growing numbers of students, as well as demands on the educational system to undertake a range of reforms have resulted in heavy reliance on aid and loans from international aid agencies and other countries. As previously indicated, the government of Jordan had only a 35% share in financing the ERfKE project, while the remainder was secured through international partners. In addition, figures show that foreign aid comprises a substantial amount of the total spending on education in Jordan. In 2005, the budget of the Ministry of Education was JD332,311,000 (1 JD=1.42$US) and the contribution of international aid was as high as JD171,660,000 (51%) (Ministry of Education, 2007). The scarcity of resources available for educational reform might suggest that it is inevitable that the Jordanian educational system will seek assistance from external partners in order to finance large-scale education reforms.

Since the 1970s and 1980s, the numbers of development enterprises and NGOs worldwide have increased sharply (Appleby, 2005), estimated to be two million worldwide in 1999 (Bhagwati, 2004). The literature has discussed the growing involvement of international aid agencies in national reform projects, especially in developing countries. Todaro (1985) indicated that the inflow of foreign financial resources represents an important ingredient in long-run development strategies for non-oil exporting nations. In addition, the increase in the number of NGOs has been intertwined with globalization and the formation of international institutions which, according to Fischer (2006), "dictate laws to developing countries" (p.176).

The various categories of 'players' in development projects, including diplomats and politicians, development bureaucracies, NGOs, implementers and participants, have different objectives that may not always coincide (Appleby, 2005; Escobar, 2004) and which might cause disruption or derailment during the implementation of projects.

2.3   Summary

Since the early 1990s, the Jordanian education system has made several educational interventions aiming to integrate ICT. Moreover, by the turn of the 21st century, the global changes have created a need to accelerate this process. Motivated and influenced

by the general climate in Jordan and worldwide, the education system launched a large-scale national project called (ERfKE) accompanied by the *Jordan Education Initiative* (JEI) with the aim of updating the system to meet the needs of the knowledge-based economy. However, implementing an expensive large-scale educational intervention can be confronted by three main factors: Jordan's location in the Middle East, a region with frequent disruptions; the country's scarce resources and its reliance on external aid, and the complexity involved with ICT integration in educational settings. I have presented in Chapter 2 the impact of the first two factors on the Jordanian education system's integration of ICT. In Chapter 3, I will proceed to explore the third factor.

Chapter 3

ICT in Education: The Promise

A review of the literature

> *Technology is neither good, nor bad, nor is it neutral*
>
> (Kranzberg, 1986, p.545)

In Chapter 2, I drew a picture of the Jordanian educational system, examining its attempts to integrate ICT across the system and thereby prepare students for the knowledge-based economy. In order to gain a full understanding of the research issue in hand, it is necessary to situate the Jordanian education system's experience of ICT integration within the global literature. However, the contribution of many developing countries, including Jordan, to educational scientific research in general, and to ICT integration in educational contexts in particular, is slim, and accordingly, while I will examine that which exists, I will also review global research on this topic.

I will start by exploring the *information age*, which has resulted in ICT having increasingly become a priority and an inevitable choice for individuals, societies and countries worldwide. I will discuss the implications of information age discourses on educational systems and the growing pressure on them to undertake fundamental educational changes by integrating ICT. Furthermore, I will discuss the contribution of ICT integration to overall school improvement.

3.1   The Rise of the Knowledge Society

Knowledge has been a main ingredient of any economy, in that it is applied to produce or acquire tradeable goods (Bereiter *et al.*, 2005). Terms such as "knowledge society" and "knowledge workers" are currently being used extensively to underline the enhanced role of knowledge in the current era. Technological transformations are

intertwined with globalisation, and together they are creating the network age (UNDP, 2001).

According to Castells (2000), the information age has subsumed the industrial era, and this new era has been characterised and shaped by the emergence of ICT. Castells (2000) also argues that a fundamental feature of social morphology in the information age is an increasing reliance on networks which are, according to Kearns and Grant (2002), transformed by ICT. That is, in both these ways the information age has emerged with ICT as a dominant enabling force. Now, countries are struggling to stay connected to the global network, where valued people and territories are switched on, and devalued ones are switched off, with the latter facing social, or global, exclusion and risks falling into *informational black holes* (Castells, 1997; Ogilvy, 1998).

Becoming a part of the global network is becoming a necessity in order for countries and people to reap the benefits of the global information-based society (Mansell *et al.*, 1998) where the basis for the economy is knowledge instead of commodity. The diffusion of ICT has been seen as instrumental to the productivity and competitiveness of countries (Castells, 1999a). However, countries, communities, and individuals differ markedly in their ability to afford and maintain such innovation. For countries with few resources, poverty and underdevelopment, a transformation towards the information age can be an immense challenge.

Indeed, geographical barriers have fallen in the face of the development of communication technologies (Castells, 1997; Negroponte, 1995; UNDP, 1999). According to Negroponte (1995), many activities, such as these performed by knowledge workers, are not dependent on time and space, as workers in one project might be based in different countries, communicating and working using ICT. Castells (1997) shares this view, arguing that *time* and *space* have been re-defined in the information age with the elimination of sequences of time as well as through enhanced connections between distant locations via communication technologies. However, the disappearance of geographical barriers has been intertwined with a new invisible barrier in the form of a *digital divide* between people, societies, and nations, a barrier which embraces the connected and excludes the rest (UNDP, 1999). Therefore, according to Fischer (2006), advancement in ICT has contributed to the creation of "societal

fractures and a technological apartheid that separates the info-rich and the info-poor"
(p.181).

The UNDP's (1999) *Human Development Report* found that:

> The network society is creating parallel communications
> systems: one for those with income, education and literally
> connections, giving plentiful information at low cost and
> high speed; the other for those without connections, blocked
> by high barriers of time, cost and uncertainty and dependent
> upon outdated information. (p.63)

Thus on the one hand, there has been optimism about the role which ICT can play in connecting people worldwide through ease of communication and transportation. But on the other, ICT may have severe consequences on individuals, communities and countries if they fail to secure their spot on the network or are unable to utilise it once they gain access.

3.1.1   The Digital Divide

I now move to examine more closely the nature of the digital divide.

In its basic form, the digital divide is concerned with the *information haves* and *information have-nots* (U.S. Department of Commerce, 2000). That is, it illustrates the gap between those who are able to access and apply ICT and those who are not (Australian Institute for Social Research, 2006). According to the OECD (2001b), the term is usually used to refer to

> the gap between individuals, households, businesses and
> geographic areas at different socio-economic levels with
> regard both to their opportunities to access information and
> communication technologies (icts) and to their use of the
> Internet for a wide variety of activities. (p.5)

Moreover, there are multiple divides rather than a single one (ITU/UNCTAD, 2007). Most fundamentally, according to Norris (2001), the divide can be *social* or *global*. The former concerns the gap between information rich and poor within the same nation, which may be found between men and women, or between the young and elderly. On the other hand, the latter refers to the divergence of Internet access between

industrialised and developing nations, as access to ICT is still the major factor which enables individuals and nations to participate in and benefit from the knowledge-based economy.

Castells (1998) discusses the concept of *informationalism,* which he defined as a "mode of development in which the main source of productivity is the qualitative capacity to optimise the combination and use of factors of production on the basis of knowledge and information" (p.7). He highlighted that the rise of informationalism has been intertwined with inequality and social exclusion, which has led to the emergence of the *Fourth World,* especially in sub-Sahara Africa. The main factor underlying the digital divide is "differences in wealth, between countries and individuals […] while disparities in wealth continue to exist, the digital divide will persist" (ITU/UNCTAD, 2007, p.21). This concept was also highlighted by Castells (1999a), who asserts that "technological apartheid" (p.3) is difficult to remedy when one-third of the world's population survive on one (US) dollar a day, and he argued that the transformation to the information age has created unprecedented inequality and exclusion on a planetary scale.

However, access to ICT goes beyond the physical access to include access to training, access to significant local content in the language of the user, and access to the processes by which telecommunications decisions are made (Servon, 2002). While gaining access is a prerequisite for benefiting from and participating in the knowledge-based society, the provision of content in the local language can also determine the degree of communities' and regions' benefit from such access (Boyd, 2003).

3.1.2 Bridging the Digital Divide

Countries worldwide have created national initiatives in order to prepare their own citizens for the knowledge-based economy. These include, for example, projects such as *Falling through the Net project* (USA), *Indigenous Communities Online Program* (ICOP-Australia) and *Connecting Jordanians Initiative* (CJI-Jordan). At the global level, developed countries and international organisations have stepped up efforts to combat the global digital divide by providing financial and technical assistance.

In 2000, during the *Millennium Summit*, the United Nations adopted a charter of eight *Millennium Development Goals* (MDGs) which was signed by 189 world leaders. These goals represented an international agreement to assist the world's poor nations to combat issues ranging from extreme poverty to the provision of universal primary education by the target date of 2015. One of these goals cited *global partnership for development,* which proposed greater cooperation between governments and the private sector in order to make available the benefits of new technologies - especially information and communications technologies (United Nations, 2005).

There has been optimism that the steadily decreasing costs of the Internet and increasing ease of use "will continue and that controversies about the digital divide will fade away" (Compaine, 2001, p.ix). Certainly, since mid 1990s, the world's adoption of ICT has increased steadily. Internet usage between 2000 and 2007 worldwide increased by 214 % (Internet World Stats, 2007). Negroponte predicted in 1995 that if the population of the Internet continued to increase at the same rate in mid 1990s "the number of Internet users would exceed the population of the world by 2003" (1995).

However, the steady increase of Internet usage worldwide has perpetuated rather than diminished the digital divide. Access to the Internet is still a major challenge in many countries worldwide (Mutonyi *et al.*, 2007). A United Nations 2006 progress report, *The Millennium Development Goals Report,* stated that "access to information and communication technologies grows steadily, but 'digital divide' persists" (United Nations, 2006, p.25). Strikingly, the report indicated that while half of the population in developed regions had access to the Internet in 2004, only 7% had access in developing regions, and a mere 1% in the 50 *least developed countries*. The most recent figures show no lessening of the global digital divide (Figure 3.1 below).

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

Figure 3.1:   Internet Penetration by World Regions. (Source: Internet World Stats, 2007, http://www.internetworldstats.com/stats.htm)

A major feature of the digital divide, and one which is difficult to address, is its dynamic nature. As indicated earlier, the digital divide is multi-leveled, involving several categories (e,g. men/women, rural/urban and young/elderly). Furthermore, it is dynamic, that is it evolves over time. Apparently, older technologies tend to become more evenly diffused than the new ones. For example, whereas television is more evenly spread after nearly seven decades since it became commercially available, other new technologies such as third Generation (3G) wireless technologies are not yet widely available (ITU/UNCTAD, 2007). Therefore, the fast pace of technological development and the already widening digital divide makes bridging the divide elusive and challenging.

Although as noted earlier, numerous aid programmes have been initiated in order to support technological development in poorer nations, the motivation behind such programmes has been questioned. While developed countries argue that such aid is motivated by moral values aiming to assist poorer countries to prosper, participate and benefit from the knowledge-based economy (UNDP, 1999), critics are sceptical, arguing that in practice this has often served to benefit the industrial world (Castells, 1999a; Forman, 1995; Norris, 2001). According to Fischer (2006), it is "simplistic to

maintain that rich states offer generous and compassionate aid devoid of mercenary ulterior motives" (p.177). Wilson (2004) also argued that the reason behind developed countries' concern about developing countries' embrace of ICT is commercial, political, and social. In this sense, developing countries are increasingly becoming large markets for Western industries, and a significant part of the global market.

3.1.3 ICT in development context

It is widely believed that ICT is the main driver of economic growth and prosperity and that it will maintain this position for the foreseeable future (Atkinson *et al.*, 2007; Kozma, 2005). ICT has had a major impact on the flows of goods, services, capital and knowledge between countries around the world (Kozma, 2005). Thus, governments and systems around the world increasingly embrace the promise of ICT not only in their rhetoric, but also in their investments (Durrant, 2001). For these reasons, nations and individuals are increasingly pressured to adopt ICT in order to be able to participate and benefit from the knowledge-based economy.

Notwithstanding such pressures, there is at the same time a growing belief that ICT does not make development by itself. Kranzberg (1986) Laws cited that "technology is neither good, nor bad, nor is it neutral" (p.545)*.* According to Castells (1999a), neither the advanced technologies nor the sheer number of engineers can be a factor for development by itself "without an appropriate organisational environment" (p.3). Rather, it is the entire social organisation that undertakes development and becomes either productive or an obstacle for productivity. Therefore, efforts to bridge the digital divide should move away from the focus on technology itself as the drive for development towards the integration of technology into comprehensive and larger plans for socio-economic development.

For such large social and economic transformations, education is often perceived to be the key for such transformation (Leithwood *et al.*, 2002). According to Fullan (1993), among all other societal organisations, education is the only "one that *potentially* has the promise of fundamentally contributing to this goal" (p.4, italic in source). At the collective level, society relies extensively on education to maintain its values and to prepare its citizens to be part of a flexible, dynamic, and skilled workforce.

Globalisation and economic competition are increasingly driving educational outcomes. According to Hill and Crevola (1999), as countries are experiencing the full impact of globalisation and the IT revolution, high levels of education attainment translate into improved life and job opportunities. Consequently, there is a growing tendency for even greater discrimination between the well educated and the underemployed (Eastin, 1999). Furthermore, Wallace (2003) notes that due to globalisation and to the collapse of communism, the time has passed when provision of a broad education was the prime goal of educational systems. Now, governments are pressured to intervene as they increasingly conceive education as the key the global economic competition (Nguni *et al.*, 2006; Sahlberg, 2006).

With countries having a large proportion of their citizens as students at some stage or another, investing in education is often conceived as investment in the future. Castells (1997) argued that a strong public school system is the key to social, political and economic renewal in society. In addition, as Fullan (1993) puts it, having healthy school systems is a clear indication of a healthy nation. Thus, preparing nations for a major transformation might, significantly, start with schools. ICT has carried the promise of significantly improving teaching and learning, and this promise is explored next.

3.2 ICT in Education

ICT in education has witnessed a dramatic transformation over the last three decades. In the early stages of computers in education, during the 1960s and 1970s, there was excessive enthusiasm and hope that computers would revolutionise teaching and learning (Maddux *et al.*, 2001; Veen, 1993). During that stage, technology was conceived as an end in itself, which resulted in computers being distributed to schools with little thought given to their best use (Richardson, 2005; Veen, 1993). This led to a debate on the extent to which computers might contribute to education (Maddux *et al.*, 2001; Sandholtz *et al.*, 1997). A debate raged between advocates and critics arguing the question: "is there a danger that the computer will impose a rigid and impersonal regime on the classroom and even replace teachers?" (Suppes, 1980, p.234). However, since the 1980s, there has been another shift, which followed the realisation that technology cannot revolutionise education by itself (Veen, 1993). The focus then switched to

computers as pedagogical tools which can contribute to improving teaching and learning (Kulski *et al.*, 2002; OECD, 1987). At that point, teachers' role gained extra attention, with numerous studies exploring the role of teachers in the process of integrating ICT into education (Abadiano *et al.*, 2001; Coutts *et al.*, 2001; Hasan, 2000; Lai, 1993; Somekh *et al.*, 1997).

Researchers have identified three main rationales for integrating ICT across educational systems: social, vocational, and pedagogical (Castells, 1999b; Hawkridge, 1989; Logan, 1995; Maddux *et al.*, 2001; McDonald *et al.*, 1997; Means, 1994; Reeves, 1998; Subhi, 1999).

Vocational

The vocational rationale considers the necessity for a society to have skilled technological workers, and relates learning to future jobs and careers. This rationale can also be understood in term of the growing demand on workers to be ICT literate (1999). In addition, this rationale stems from the fear that students might not be prepared to compete in or adjust to workplaces where ICT is extensively used (Cuban, 1993).

Social

The social rationale for ICT integration into education asserts the need to prepare students for active roles in society by familiarising them with ICT. It also reflects the importance of ICT skills in students' future, as ICT increasingly penetrate all aspects of their lives.

Pedagogical

The pedagogical rationale emphasises the role of ICT in improving and enhancing teaching and learning. At one level, this is concerned with the type and levels of skills that it is regarded as essential for contemporary students to develop during their schooling (Hawkridge, 1989; Subhi, 1999). At another level it stems from the work of scholars such as Vygotsky and Dewey, whose works have stimulated a range of educational theorists who wish to change schooling from that place where 'knowledge' is 'transmitted' to a place where students become active and dynamic participants in learning (Cuban, 1993).

Table 3.1 shows a summary of the 21st century skills as identified by enGauge (2003). While a person with reading, writing and calculating skills used to be considered as literate in the 1900s, these skills are no longer considered adequate for a person who wishes to participate effectively in the digital age. Now, additional skills, such as teamwork, collaboration, communication, and ICT proficiency are coming to be considered essential.

Digital-Age Literacy	**Inventive Thinking**
• Basic, Scientific, Economic, and Technological Literacies • Visual and Information Literacies • Multicultural Literacy and Global Awareness	• Adaptability, Managing Complexity, and Self-Direction • Curiosity, Creativity, and Risk Taking • Higher-Order Thinking and Sound Reasoning
Effective Communication	**High Productivity**
• Teaming, Collaboration, and Interpersonal Skills • Personal, Social, and Civic Responsibility • Interactive Communication	• Prioritising, Planning, and Managing for Results • Effective Use of Real-World Tools • Ability to Produce Relevant, High-Quality Products

Table 3. 1:   21st Century Skills, (enGauge, 2003, p.15)

However, Fullan (1993) had earlier warned that these reasons have become clichés used by policy-makers. Despite the growing recognition of ICT as a necessity for education in developing countries, its integration is still shadowy. According to Wagner (2005), ICT plans in developing countries are generally still not connected to national educational strategies with clearly defined objectives. Wagner also points out that evaluation in these contexts is still subjective, being based on "common sense" as well as testimonies of key actors.

At the same time, Fullan (1993) asserts the "moral purpose" of education as its potential for making a difference in the lives of students and for helping to produce citizens who can "live and work productively in increasingly dynamically complex societies" (Fullan, 1993, p.4). The pervasive role of ICT makes students' ICT proficiency a necessity for them to be able to compete in the information age. The ways in which

innovations have been introduced into education are further explored in the next section.

3.2.1 Educational Reform and the Adoption of Innovations

Theoretically, "the purpose of educational change presumably is to help schools accomplish their goals more effectively by replacing some structures, programmes and/or practices with better ones" (Fullan *et al.*, 1991, p.15). That is, we seek educational reform because of dissatisfaction with the status quo (Niederhauser *et al.*, 1999; Shuldam, 2004), inconsistency, or intolerability in our current situation (Fullan *et al.*, 1996). According to Ely (1999), educational reform is sought when we feel that something is not right, others are moving ahead, or we are standing still, and therefore we act in order to improve our situation.

Consequently, as we often do not know what we want, the *what* and *how* questions must be the core of any change (Fullan *et al.*, 1991). However, Castells (Cited in: Ogilvy, 1998) warns that action for change has to be driven by knowledge, for which research is a tool that ensures making informed decisions instead of relying only on either theory or practical experiences in order to achieve goals. Generally, when we are not clear about what is our decision then, according to Maddux *et al.* (2001), we might:

1) rely on experts to tell us what to do;
2) use what is currently popular;
3) simply continue doing what we have always done in the past; or
4) rely on trial and error.

Fullan and Stiegelbauer (1996) state that innovations can be adopted for symbolic, political, or personal reasons, such as in order to absorb societal pressure, to appear innovative, or to gain more resources. Therefore, Guskey (1999) claims that in most cases the adoption of new innovations is opinion-based rather than research-based. In such cases, decisions might be made in order to attract resources with less concern attached to the ways in which resources will be spent (Downes *et al.*, 2001).

Accordingly, Fullan (1991) stresses that change is not needed if there is no need for change.

Educational change does not happen overnight: it requires time to be seen as an integral part of the system (Fullan, 1982). In addition, change is seen to be a long process of implementation and modification to ensure maximum suitable condition for the new innovation to work properly (Evans, 1996; HanneleNiemi, 2003). Therefore, educational change should be seen as a process rather than an event (Anderson, 1997), which requires time and modification during implementation, where teachers are given time to develop familiarity with and experience of the new innovation (Veen, 1993). The ways in which this has happened in relation to ICT integration globally are outlined in the following section.

3.2.2   ICT Diffusion across Education Systems

As noted earlier, there has been increasing demand for educational systems to undertake changes that embrace ICT in order to stay abreast of the emerging needs of the knowledge-based society. However, calls for ICT adoption have also been accompanied by warnings of possible failure, as numerous experiences worldwide have shown ICT to be ineffective in improving educational outcomes, not because of the value of ICT itself, but because of failure to use and apply it productively (Dimmock, 2000).

Surry and Farquhar (1997) discuss two major IT-related diffusion theories: developer-based theory and adopter-based theory. The developer-based theory emphasises the superiority of technology itself, and assumes that developing a significantly superior innovation to existing ones will guarantee its diffusion. On the other hand, adopter-based theory focuses on the human, social and interpersonal aspects of the diffusion and assumes that it is these factors which dominate in determining the success of the diffusion. Furthermore, Maddux and Cummings (2004) pointed to the "pendulum syndrome" in adopting innovation. They indicate that decisions to adopt an innovation tend to start with unrealistic optimism, and are followed by too-hasty, widespread adoption in schools. However, innovation then often fails to meet the initial expectations, which results in its premature abandonment. Generally, the abandonment of an innovation results in the later adoption of a new one simply because it is new.

Guskey (1999), too, warns against adopting change for change's sake, and he cautions against the myth that if 'it is new then it must be better'. Therefore, educational systems are warned not to undertake educational change only for the sake of change itself, and to be wary of fads (Fullan, 1982; Mumtaz, 2000). The literature indicates that education systems frequently adopt and then abandon initiatives without even having given the newly adopted ones fair trials (Holland, 2002; Maddux *et al.*, 2004). Therefore, an educational change has to be fully implemented in order to achieve its objectives (Gross *et al.*, 1971)

Flitting from fad to fad, according to Holland (2002), can clearly result in innovations not being implemented fully in practice. Educational systems worldwide are haunted by educational interventions that never took roots because of interruptions or partial implementation. This has usually resulted in an educational change that is "a mile wide and an inch deep" (Nadler *et al.*, 1993, p.240). Therefore, Holland (2002) argued that educational systems contribute to the problem if they respond to clever marketing techniques which justify adopting innovations. Therefore, despite Fullan's (1993) assertion that change is powerful and relentless forcing itself on us, he stresses that we should learn how to contend with change by "turning positive forces to our advantage, while blunting negative ones." (p.vii)

When reforms are introduced in education more broadly, they are comprised of a series of stages. It is these stages which are reviewed in the next section.

3.2.3   Stages of ICT integration

Rogers (2003) defined two main stages for the diffusion of innovations in organisations in general: initiation and implementation. The initiation stage consists of two stages: agenda-setting and matching. The implementation stage consists three stages: redefining, clarifying, and routinizing. Ely (1999) cited four similar stages: diffusion, adoption, implementation, and institutionalization. Fullan (1982) also identified four stages: initiation, implementation, continuation, and outcomes. Obviously, the three models underline the importance of the implementation stage and the following stages as there has been a growing awareness that the diffusion of innovations in schools might not lead to them being properly implemented.

During the initiation stage, according to Roger's model, the organisation gathers information about a certain innovation and tries to conceptualise it according to the organisation's own context, following which it makes plans for adopting and implementing the innovation. The agenda-setting stage occurs when an organisational problem is identified and a perceived need for an innovation is created. Consequently, the matching stage occurs when a defined problem fits with an innovation. Further planning is then made according to that organisational context and anticipation of the benefits and problems which may result from the innovation. This process lays the ground for *implementation*.

When the innovation is implemented, it is re-invented to meet the organisation's needs, and the organisation might also restructure itself to fit with the innovation. In this stage, the innovation starts to lose its foreign character, and thereafter, it gradually becomes clearer to the organisation's members. The last stage, routinizing, occurs when the innovation dissolves within the organisation and becomes a regular activity of organisation members. However, according to Rogers (2003), routinizing is more complex than it might seem. He explained that this stage is closely related to the sustainability of the intervention after the initial efforts for adoption are complete. This stage has been also called 'institutionalisation' by Ely (1999), and 'continuation' by Fullan (1982).

During the 1960s, educational reforms were mainly concerned with the diffusion of innovations across education systems. The term implementation was not used or even considered as a problem by educators in planning for educational interventions (Fullan, 1993). Apparently, this conception had its roots in the industrial era when the production assumed that outputs would correlate highly with inputs (Cassidy, 2003). Therefore, simple deployment of innovations and technologies in education was expected to improve educational outcomes. However, this has not been the case with education.

Global experiences of the 1960s and 1970s were disappointing as massive spending on new technologies failed to revolutionise, or even significantly add value to education. Consequently, there was a shift in the conception of the diffusion of innovations to place more emphasis on the implementation stage (Ely, 1999; Fullan, 1982; Fullan *et*

al., 1996; Gross *et al.*, 1971; Rogers, 2003). Rogers (2003) stresses that once an organisation has made a decision to adopt an innovation, implementation does not always follow directly and he thus, as noted earlier, distinguishes between adoption (the decision to use an innovation) and implementation (putting an innovation into use). Furthermore, Fullan and Stiegelbauer (1996) identified three main categories of factors that contribute to the implementation of innovations in educational change:

1) Characteristics of the change: (need for change, clarity, complexity, and quality);

2) Local characteristics (district, community, principals, and teachers); and

3) External characteristics (government and other agencies).

These factors are particularly helpful to understand the diffusion of ICT across educational systems, especially when a top-down approach is used for the diffusion. Now I move to explore top-down approaches in the diffusion of ICT.

3.2.4   Top-down reform

Top-down mechanism of ICT integration is mandated by central authority and diffused across an educational system. It has been argued that this mechanism can be necessary in order to create a favourable environment for ICT within a given educational context (Pedrelli *et al.*, 2001). However, the model has also been received with scepticism. According to Gilmore (1995), for example, top-down educational interventions are generally under-resourced, badly-understood, or simply unpopular with teachers, all of which naturally affect the quality of the intervention itself.

Top-down educational reforms illustrate the desire of the central authorities to improve the performance of educational systems through centrally designed and managed interventions. Such interventions, according to Surry and Farquhar (1997), usually focus on the product (reform) and its superiority to the existing practices. Therefore,

> By specifying goals, organisational structures, managerial philosophies, instructional products, and fiscal strategies that have been proven to be, or at least theorized to be, superior to existing practice, top down school reformers are counting on

technological superiority to bring about change. (Surry *et al.*, 1997, p.12)

According to Surry and Farquhar (1997), this is based on the developer-based theory, which, as previously noted, overestimates the technology itself from the point of view of its developers, and underestimates the adopters' points of view.

Another model cited in the literature for educational reform is bottom-up reform aided by top-down support, which is, according to TeleLearning (1999), an increasingly popular approach. According to Means, Blando, Olson, Middleton, Morocco, and Remz (1993), this model is in line with the site-based management model which gives more power authority, and accountability to teachers by involving them in the reform. This model may enhance teachers' understanding of the reform, and their willingness to implement an innovation to which they have contributed. Furthermore, Rogers (2003) compares innovations in centralised and in decentralised systems. In the former, an innovation is diffused by a central authority to the potential adopters while in the latter the innovation is created at the operational level by certain lead users (See Figure 3.2).

Centralized Diffusion System

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        ┌─────────────────────────────┐
        │   Research & development    │
        └─────────────────────────────┘
                      │
                      ▼
              ┌───────────────┐
              │  Change Agent │
              └───────────────┘
                      │
                      ▼
              Opinion Leaders

  ↓    ↓    ↓    ↓    ↓    ↓    ↓    ↓
  ■    ■    ■    ■    ■    ▣    ▣    □     Adopters
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Decentralized Diffusion System

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        ┌──────────────────────────────────────────────┐
        ▼                       ▼                        ▼
┌─────────────────┐   ┌─────────────────┐   ┌─────────────────┐
│ Local Innovators │◄─►│ Local Innovators │◄─►│ Local Innovators │
└─────────────────┘   └─────────────────┘   └─────────────────┘
  ↕  ↕  ↕  ↕            ↕  ↕  ↕  ↕            ↕  ↕  ↕  ↕
  ■  ■  ■  ▣            ■  ■  ▣  ▣            ■  ■  ▣  □        Adopters
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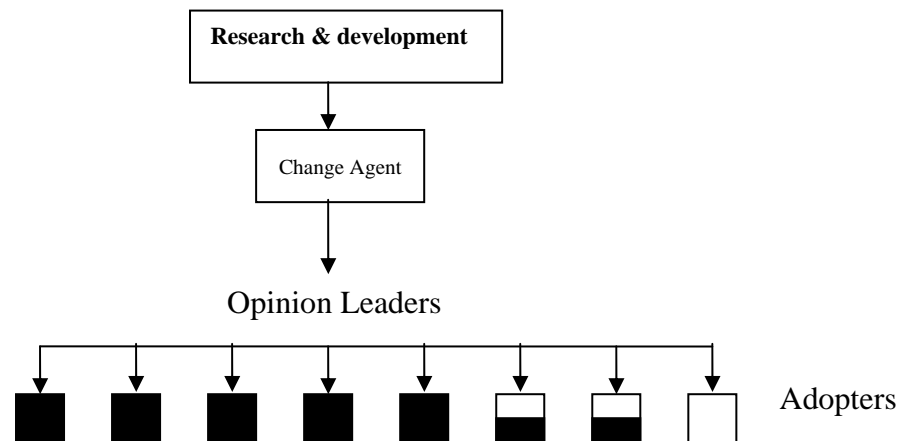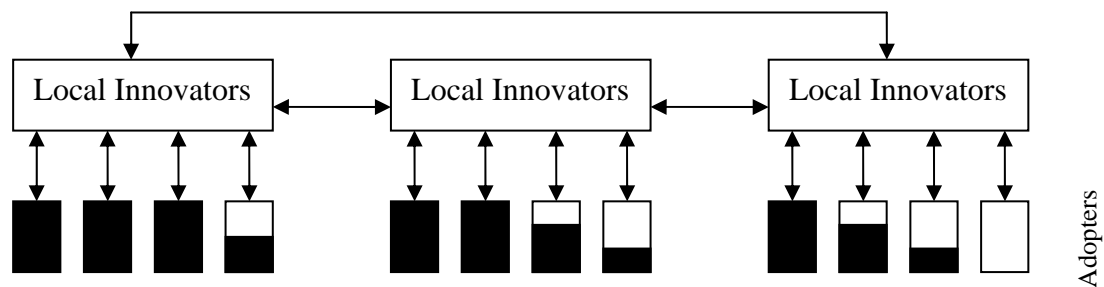
Figure 3.2:   Centralised and Decentralised Systems. (Adapted from: Rogers, 2003, p.397)

The complexity of educational contexts can limit the effectiveness of top-down mechanisms of diffusing innovations. According to Tyack and Cuban (1995), top-down regulations can, at best, create some necessary but not sufficient conditions which attract interested teachers and curious students. In addition, Fullan (1993) asserts that what really matters for educational change cannot be mandated because it requires complex skills, creative thinking and committed action. He argues that "you can effectively mandate things that (i) do not require thinking or skills in order to implement them; and (ii) can be monitored through close and constant surveillance" (p.22). Moreover, Fullan (2003a), distinguishes between the role of the central authority and the implementers of educational change. He asserts that

> Engaged students, energetic and committed teachers, improvements in problem-solving and thinking skills, greater emotional intelligence, and, generally, teaching and learning for deeper understanding cannot be orchestrated. (p.3)

The top-down model of educational reform tends to be implemented in a large-scale format involving a whole educational system or districts. Now I move to explore the nature of educational reforms which are conducted on a large-scale.

3.2.5 Large-scale educational reforms

Globally, according to Fullan (2000a), large-scale education reform was first attempted during the 1960s, resulting in massive resources and efforts being poured into large-scale national projects. However, such efforts generally failed because they did not take into account the complexity of education change. The 1990s saw the return of large scale-reforms worldwide, but this time there was a greater appreciation of the complexities involved (Fullan, 2000a).

Often, governments and members of the public press for large-scale educational reforms because smaller-scale reforms, which might be initiated from schools or classrooms, are do not satisfy the sense of urgency often cited for undertaking radical educational change (Leithwood *et al.*, 2002). Therefore, according to Leithwood *et al.* (2002), large-scale education reform, is formed not for its superiority, but because it is that preferred by policy makers and the public.

There are many factors which interact at all levels of the educational system to threaten the success of large-scale reform. It has been said that the success of policies involving large-scale reforms is a function of two variables: the content of the policy which is defined by its substantive components and its rationales, and the institutional context of the policy in which it is implemented (Johnson, 2000). Therefore, reform continues to be shaped and influenced by its implementers and its success remains vulnerable during implementation. Huberman and Miles (1984) inferred that : "Large-scale […] innovations lived or died by the amount and quality of assistance that their users received once the change process was under way" (p. 273).

3.3   School Adoption of ICT

Schools are often perceived as rather rigid and static enterprises which are operating in a rapidly changing world. This paradox is the result of the expected central role of public schooling in the transformation of societies set against their self-contained culture and their slow pace in adapting to changes in society. Public schools, according to Fullan (1999) help in producing citizens who have the commitment, skills and dispositions to foster norms of activity, compassion, fairness, trust, collaborative engagement and constructive critiques under conditions of great social diversity. At the same time, external attempts to improve schools' performance usually challenged by the self-contained nature of schools and their rigidity. Elmore (2002) warned that such rigid structures will eventually break if they are pushed hard for change.

In the following section, I will explore schools' contexts and their attempts to integrate ICT. I will examine four major areas:

- Teachers' adoption of ICT;
- Follow-up and ongoing support;
- School leadership;
- Infrastructure.

3.3.1   Teacher adoption of ICT

As previously mentioned, until the 1980s, the role of teachers in the integration of ICT was neglected in favour of a focus on computerisation and technology itself. However, disappointing experiences with computers in 1970s and 80s, resulted in extra attention being to the human side of ICT integration across educational systems. This shift has given more attention to teachers, as they are seen as central to the success or failure of any educational intervention. Teachers' capacities to deal with educational changes, to learn from them and to help students learn through them are crucial for the development of societies, which makes teachers hold a key role in the improvement of students, and eventually the larger societies (Fullan, 1993).

There a growing consensus that teachers are the primary agents for school change and the final arbiters of classroom practice (Cochran-Smith, 2004; Doyle *et al.*, 1977;

Gillingham *et al.*, 1999; Sarbib, 2002; Townsend *et al.*, 2007). Teachers are central to the integration of ICT across educational systems and they do not operate only as passive accepters of plans and reforms created at the upper levels of educational systems (Rogers, 2003). Although teachers may have little choice over whether or not to use ICT, they retain a fundamental role in deciding how and when to use ICT in the classroom (Sabieh, 2001; Somekh *et al.*, 1997). Therefore, any attempt to coerce teachers into implementing plans against their own beliefs might stimulate a negative response. That is, according to Tyack and Cuban (1995), regulations and mandates can "compel responses but the results may be compliance of a kind that actually dampens excellence" (p.80).

Veen (1993) asserts that teachers' beliefs about content and the pedagogy, along with their overall competence, far overweigh any other factors in respect of their adoption of ICT, including technical support provided by schools, and principals' support of ICT integration. Other studies have confirmed that such teacher factors as competence, attitude and time, are of a greater significance than factors associated with hardware (Farenga *et al.*, 2001; Means, 1994; Veen, 1993).

When any innovation is introduced into a school, it is likely to receive varied responses from teachers and such is the case for ICT integration. According to Rogers (2003), teachers fall into five main categories in their uptake of ICT:

- Innovators: those who tend to be obsessed with new ideas and trying to find better ways to do things;

- Early adopters: those who first adopt new innovations, and who can facilitate others' adoption;

- Early majority: those who do not lead in the adoption and who take longer than early adopters in deciding to adopt;

- Late majority: those who adopt ICT after the average members of the organization, and for whom adoption usually occurs due to pressure or a feeling of being 'left behind';

- Laggards: who believe that there is no need for change as they believe in what they had been doing in the past.

The adoption of innovations over time usually follows a Bell-shaped curve (Rogers, 2003, 281. See Figure 3.2). Innovations introduced into schools are likely to taken up quickly by Innovators and Early Adopters. These two kinds of teacher would establish schools' adoption, as well as influence the Early Majority and thus can eventually create a *critical mass* of adopters. Thereafter, the Late Majority would feel pressured to adopt the innovation after successful adoption by the critical mass. However, it would take more time and greater effort to convince the Laggards of the need to adopt.
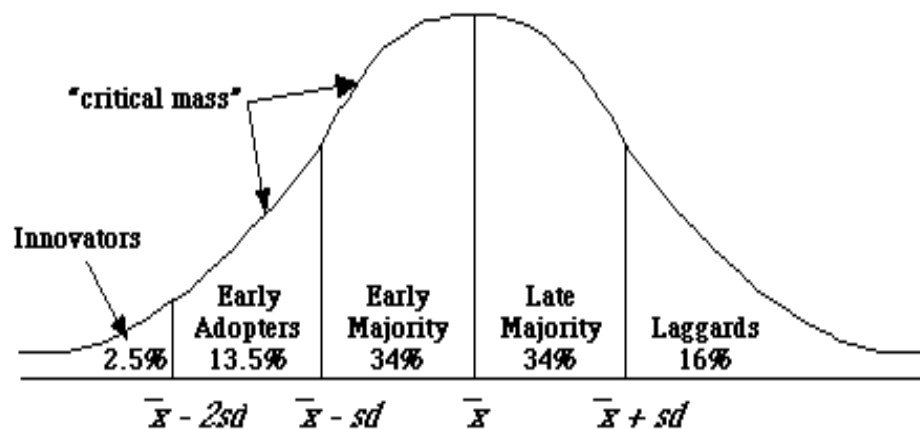
Figure 3.3:   The five categories of adopters of innovations over time (Rogers, 2003, 281).

Stages of adoption of innovations have also been explored at the level of individual teachers by Apple Computers of Tomorrow (ACOT). The study was a longitudinal one conducted between 1985 and 1998 by Apple Computers (Apple Computer, 2007). The study's validity has been questioned because of its commercial sponsorship by Apple Computers (Fluck, 2003), but this remains one of the most extensive and validated studies in the area of ICT integration in education (Dwyer *et al.*, 1991; Sandholtz *et al.*, 1997). The study found that changes involving technologies are evolutionary, where teachers proceed from one phase to another as they develop their familiarity with computer skills (Sandholtz *et al.*, 1997). The study identified five phases of development in teachers' adoption of computers: Entry, Adoption, Adaptation, Appreciation, and Invention (Dwyer *et al.*, 1991; Sandholtz *et al.*, 1997):

- **Entry:** during this stage teachers tend to use technology within the traditional teaching approach, and they experience problems typically

faced by novice teachers: discipline, resource management, and personal frustration which comes from making time-consuming mistakes. So, during this stage, teachers still evaluate their adoption and its value.

- **Adoption:** Teachers in this stage tend to remain concerned about technological issues while they retain their familiar and conservative teaching patterns, such as recitation and whole group lecturing.
- **Adaptation:** in this stage, technology becomes thoroughly integrated into traditional classroom practice, and students become more engaged in lessons.
- **Appropriation:** teachers start to use technologies in their classes effortlessly in order to accomplish their work and they experience positive changes in their attitude towards technology.
- **Invention:** teachers in this stage become more confident in their use of technology and new instructional approaches emerge, such as interdisciplinary project-based instruction, team teaching, and individually paced instruction.

As it has been outlined above, teachers' adoption and implementation of ICT are seen to be major factors in the success or failure of ICT integration. This review of relevant literature has enabled me to identify several factors thought to play major roles in teacher adoption of ICT, including teacher' competence, teachers belief and attitudes, and ICT professional development: the examination of these form the next three sub-sections.

3.3.2.1 Teacher competence

Teachers' competence is seen as a "core issue in developing the information society" (HanneleNiemi, 2003, p.89) and it is well established that teachers are centrally important for students' achievement (Cochran-Smith, 2004; Spellings, 2005). However, despite massive investment in hardware and software since computers were first introduced into education, adequate and appropriate professional development for teaching staff have been largely neglected. The recognition of teachers' pivotal role in the integration of ICT has led to questioning what it takes to ensure their competence and preparedness to handle ICT-enriched learning environment (Zhao, 2003). For these

reasons, preparation of teachers is seen as central in enabling them to utilise ICT in their instruction, and in enabling them to participate in the success of the overall integration of ICT. However, it is difficult to define what skills teachers whould master in order to be called competent in utilising ICT for the school context (Rudd, 2001).

According to standards developed by organisations such as the International Society for Technology in Education (ISTE) and the National Council for Accreditation of Teacher Education (NCATE), teachers' ICT competence can be described in three ways (Gillingham *et al.*, 1999):

1) the use of technology for personal and professional productivity;

2) acquiring both the content and pedagogical understanding needed to use computer-based technologies; and

3) understanding the impact of technology on schools and society.

Clearly, ICT skills are quite different from the skills required to implement ICT effectively in the classroom (Mathew *et al.*, 2002; Somekh *et al.*, 1997). Thus, there are two levels of familiarising teachers with ICT: first learning ICT skills, when technology is the focus of the topic enabling teachers to use these tools, and second, skills related to the pedagogical use of ICT, when technology is used to support learning and teaching experiences (Pearson, 2003).

ICT skills

Teachers need a significant level of ICT skills in order to be able to utilise ICT tools in their instruction and for their own learning. Having limited skills in this area will, of course, diminish teachers' performance in this field, and may lead to reluctance to use it (Lai, 1993; Li, 2002).

Goodwyn, Adams, and Clarke (1997) identified three categories of teachers according to their response to the integration of ICT in their instruction: the fearful, the unresolved, and the optimistic. The authors defined the fearful as those who see ICT as a threat and a source of anxiety, the unresolved as those who change and redefine their concepts, but who have strong mixed feelings; and the optimistic as those who believe that ICT can significantly enhance their teaching.

However, a problematic issue which remains is the lack of concrete definition of ICT skills required by teachers. Recently, the European SchoolNet Report (2005) asserted that the ICT skills to be mastered by teachers to integrate ICT in pedagogical practices are not yet sufficiently defined as there is still ambiguity regarding concrete definitions of terms and precise description of the required skills.

According to Granger *et al.* (2002), the implementation of ICT requires not only the *encoding* of information during programmes and workshops, but also the empowering of teachers with a level of autonomy and confidence in using ICT in the classroom. Zhao (2003) suggests that three categories of ICT skills need to be mastered by teachers in order to perform effectively in classrooms:

- a mechanical level, where teachers focus more on computers than their functions;
- a meaningful level, where teachers start to separate between form (computers) and function. Therefore, they accept alternative ways to achieve the same function, though they are still limited in their ability to use or re-purpose computers in new context; and
- a generative level, where teachers have a deep understanding of technology, so they can use technology in different innovative ways.

Willis (1994) adds a fourth, "managerial skills" category to be harnessed by teachers as they use computers to organise clerical work. Such use can ease administrative pressure on teachers so that they can find more time for learning and teaching.

Pedagogical skills

As noted above, despite the necessity of ICT skills for teachers, such skills alone are not enough for the effective utilisation of ICT pedagogically (Hakkarainen *et al.*, 2001). According to Sabieh (2001), while it may be relatively simple to teach how to use technology, this is not the case when it comes to learning how to use technology as a pedagogical tool. Indeed teachers need ICT skills, but they also need knowledge and skills that enable them to use ICT in pedagogy. Tawalbeh (2001) stressed that in Jordan, even IT teachers do not know how to teach computer subjects because they did not receive any training in the method of teaching computers in their university education.

More often than not, teacher ICT professional development focuses on teaching technical skills without showing teachers how to integrate these skills into their specific subjects (Mathew *et al.*, 2002; Sabieh, 2001). However, it is necessary to teach teachers how to incorporate what they learn in their teaching strategies and activities (Sabieh, 2001). Therefore, Somekh and Davis (1997) warned of much time spent on specific technical skills which are not transferable to the classroom setting. Teacher professional learning in the form of isolated skills on hardware and software can have limited impact on teacher practice. According to Granger *et al.* (2002) and Brand (1997), isolated skills acquired during workshops and courses do not guarantee their use by teachers when they return to their classrooms. Thus, attention should be paid to the transferability of the acquired skills into the classroom.

The impact of new knowledge and skills developed by teachers during their professional learning remains limited if teachers cannot implement them in their instruction. Graham and Thornley (2000) pointed to the importance of linking both pre- and in-service teacher education to classroom practices. They also suggest that bridging theory and practice, teacher learning should shift from knowledge reproduction to knowledge use. Similarly, Browne and Ritchie (1991) state that typical ICT professional learning on isolated skills on hardware and software can be limited and it does little to help transfer these skills to the classroom.

3.3.2.2 *Teacher belief and attitude*

Innovations should be regarded as effective by their potential users in order to be adopted. Lai (1993) found that belief and competence are central to teachers' adoption of ICT. In addition, a large body of research indicates that teachers' acceptance of and attitudes toward new innovation are key factors in the success or failure of the innovation (Grunberg *et al.*, 1992; Means, 1994; Subhi, 1999).

One of the most difficult challenges in designing teacher professional development programmes is that professional development is not just learning new skills, but also convincing teachers of the usefulness of an innovation for their profession (Downes *et al.*, 2001) and therefore adopting it. King (2002) claims that resisting change is a state of mind for many teachers and forms one of the most difficult barriers to achieving

effective ICT implementation. Similarly, Rogers (2003) notes that an early stage of the decision to adopt (or reject) an innovation occurs when the individual "forms a favourable or unfavourable attitude toward the innovation" (p.174).

A large body of research points out that the most effective factor in changing attitudes toward ICT is job-relevance (Bahr *et al.*, 2004; Billeh, 2002; European SchoolNet, 2005; Gilmore, 1995; Hu *et al.*, 2003). Therefore, it is essential for teachers to be convinced that the innovation is useful for their profession and that it has the potential to enhance students' achievement. Similarly, Higgins and Moseley (2001) stress that changing teachers' belief about ICT is highly interconnected to information about its effectiveness for students' outcomes. Therefore, professional development can play a key role by convincing teachers of the potentials of ICT in their profession.

3.3.2.3 *ICT professional development*

Several terms are used to refer to the continuing professional development of teachers, such as: staff development, in-service training, professional development, and continuing professional development (Downes *et al.*, 2001; Elmore, 2002). Guskey (2000) defined professional development as: "those processes and activities designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students" (p.16).

Teacher professional development concerned with ICT integration has undergone a significant shift over the last three decades. The first move focused on training teachers to use computers, and was mostly carried out in central locations rather than in classrooms where teachers would use ICT. The second move came after the recognition that ICT integration has less to do with technology itself and much more to do with instructional approaches. Therefore, this move has focused on how to utilise technologies in teaching and learning (Jacobsen, 2001).

It has been noted in this study at several points that well-trained teachers are the main factor that makes a difference between the success and failure of meaningful implementation of ICT and curricular practice (Farenga *et al.*, 2001; Fullan *et al.*, 1991). However, generally, there has been little spent on professional development in comparison with what has been spent on hardware and software (Sherwood, 1993).

While principals and administrators can offer a setting for change, teachers are the primary agents of school change (Gillingham *et al.*, 1999). Therefore, extensive efforts should focus on preparing teachers to utilise ICT effectively in their instruction (Jacobsen, 2001).

Both formal and informal learning are to be valued and nurtured in teachers' professional development. Granger *et al.* (2002) argue that informal teacher education, such as 'just-in-time' learning, Internet surfing, reading, interaction, on-the-job-discussion, and collaboration with peers and/or students is more effective than formal education. Thus, there has been a call to consider such informal learning when evaluating teachers' achievement in ICT professional development programmes (European SchoolNet, 2005). In addition, viewing professional development as special events, which take place at specific time during the year, can restrict teachers' learning. On the contrary, professional learning can occur every day either formally or informally. So, it is increasingly recognised that professional development should be accompanied by the concept of teachers as continuous learners throughout their professional life (Downes *et al.*, 2001; Fiszer, 2004; Guskey, 2000; Mathew *et al.*, 2002; Strudler *et al.*, 1999).

School-based professional development has been widely recognised as the most effective teacher professional learning. Differently from professional development conducted in central locations away from school contexts, a school-based model provides teachers with training in familiar and relevant contexts, clearly with colleagues they know and working with the resources available in schools (Downes *et al.*, 2001; Gilmore, 1995; TeleLearning, 1999). This model of professional development is also cited as being more receptive to school-based decision-making as well as being able to target specific training needs, such as individual teachers' varying stages of ICT adoption (Sarbib, 2002).

Several factors have been identified in the literature as influential for ICT professional development, including:

    a)   Individual differences and starting points for teachers learning;

    b)   School culture and teacher interaction; and

c)   Follow-up and ongoing support.

These main factors are discussed next.

a)   *Individual differences and starting points for teacher learning*

Teachers are widely varied in their knowledge about ICT, and in planning for teacher ICT professional development, there should be a consideration of this fact (Bradshaw, 2002; Galanouli *et al.*, 2004; Gilmore, 1995; Rosen & Weil, 1994). Such consideration can prevent programmes from being frustrating for teachers with little or no experience in using ICT, and at the same time avoid disappointing those who are regular users with more knowledge about ICT. However, Gilmore (1995) warns that addressing varied knowledge levels cannot be achieved in large classes with one instructor, and he suggests that coaching should focus on small groups of the same category of teachers.

b)   *School culture and teacher interaction*

The self-contained culture of schools is not necessarily aligned with the emerging aspects and skills of the knowledge-based economy such as collaboration, teamwork and communication. Increasingly, the world is more dynamic and in such an environment neither teachers nor schools can perform effectively in their traditional isolated ways. As Lewis (1998) puts it, schools have the potential to be learning places for teachers too, providing that the culture of schools is reshaped to facilitate this.

The role of teachers in recent years has become more complex and has expanded beyond traditional teaching. Teachers are becoming consultants, coaches, project managers, supervisors and so on (European SchoolNet, 2005; Niederhauser *et al.*, 1999; Sandholtz *et al.*, 1997). Therefore, teachers can not retain their old and traditional roles if they are being receptive to changes happening around them. According to Fiszer (2004) "isolation is the enemy of improvement when the practitioner must be ready to meet constantly changing student needs" (p.16). Moreover, the literature stresses the need for teachers to share experiences with each other in order to best learn how to integrate ICT in pedagogy.

Professional development and teachers' practices are closely linked with the follow-up and support teachers receive during their practice, and this is the next part to be explored here.

c)   *Follow-up and ongoing support*

Pre-service education is not sufficient for teachers to be able to handle their job for the rest of their lives: they require ongoing professional development and support. In the information age, where innovations are constantly introduced and change is happening at a very fast pace, the demand for ongoing professional development is in high priority (Castells, 1997; World Bank, 2002).

As indicated earlier, it might be relatively straightforward to present professional development programmes, but a greater challenge arises when teachers try to implement what they have learnt. Anderson (1997) suggests that teachers might abandon new practices while they are in the early stages of implementation because of lack of assistance. This is, according to Fiszer (2004), because teachers might see their newly developed skills and knowledge as "incompatible" with the everyday teaching/learning situations that they face (Fiszer, 2004). Therefore, it is follow-up which is likely to ensure the transferability of ideas and skills into classrooms.

Bradshaw (2002) found that to maximize the return of the investment in staff development, significant resources need to be redirected to follow-up activities. In addition, she warns that without follow-up and coaching, any staff development would not impact on more than 5-10% of participants' practice. Similarly, Lewis (1998) describes a good professional development programme as being an ongoing one, a central part of which consists of follow-up.

3.3.2   School leadership

There is consistent agreement in the literature that school leadership is widely considered as closely associated with school effectiveness (Adewuyi, 2002; Earley *et al.*, 2004; Fink, 2005; Fullan, 1993; Fullan, 2003b; Goldstein *et al.*, 2000; Richardson, 2005; Tyack *et al.*, 1994). According to Reynolds and Teddlie (2000), the powerful role of school leadership can "buffer and broker external and rapidly occurring change to the staff" (p.141). Therefore, school leadership is able not only to filter educational

interventions mandated by the upper levels of the educational system, but also it has significant influence on various school conditions.

Fullan (1997) stressed principals' effective role in creating a climate for teachers to be more effective and efficient. It has also been argued that quality of leadership makes the difference between the success and failure of schools (Leithwood *et al.*, 1992; MaCBeath *et al.*, 2002), and that school leadership has a strong impact on the feelings and actions of school members as they implement reforms and thrive to achieve goals (Fidler, 1997).

Hallinger and Heck (1998) identified four main avenues of principals' influence within schools: purposes and goals, school structure and social networks, people, and organisational culture. Therefore, principals do not only influence individuals in schools, but their powerful impact reaches the whole organisational system of schools. In addition, principals can decide on how to leed organisational change and how to support teachers during their implementation of ICT (European SchoolNet, 2005). Therefore, continuous leadership commitment is one of the major leveraging factors for the adoption of ICT by school members (Baylor *et al.*, 2002; Rathbun, 2004).They articulate visions for their schools and influence their staff to implement these visions (Mullen *et al.*, 2002). Furthermore, a good principal can create a vision that is shared by school members and makes them strive to achieve mutual goals (Leithwood *et al.*, 1992).

Principals' closeness to and understanding of teachers and students can facilitate ICT implementation and schools' overall adoption (Ely, 1999; Shuldam, 2004). Principals can facilitate teachers' interaction and learning from each other's experiences during their integration of ICT. In this way, principals can cross-fertilise ICT adoption in schools by facilitating teachers' interaction and learning from each other. It has been recommended by Baylor and Ritchie (Baylor *et al.*, 2002), that in order to be able to perform this role, principals should show their support for the integration of ICT in schools by using it themselves in ways such as communicating with staff via email.

The success of large-scale reform policies has much to do with the nature and quality of school leaders (Leithwood *et al.*, 2006). School leadership can contribute significantly

to teachers' commitment, capacities and opportunities while they engage in reforms (Leithwood *et al.*, 2002). However, although principals are deemed to be essential for school reform, their role is often underestimated and their knowledge and skills are not sufficiently maintained (Brown *et al.*, 2002). In addition, despite the recognition of the leaderships' crucial role in implementing reforms, many reform policies inhibit them and reduce their role to become only managing externally mandated changes (Fink, 2005; MacBeath, 2004; Tyack *et al.*, 1994). Therefore, principals often find themselves fettered by the constraints of larger educational system (Evans, 1996).

School leaders knowledge and skills can also play a major role in their support of and enthusiasm about ICT integration in schools. Richardson (2005) indicated that one of the main obstacles to the effective integration of ICT is the lack of engagement and confidence of school leaders in leading the development of ICT in their schools. Therefore, he stressed the importance of training school leaders in order to raise their "e-confidence".

3.3.3 ICT Infrastructure

Although there is no consistent relationship between the average amount of ICT use in schools and its apparent effectiveness in raising standards, the effective use of ICT in well-led schools with good levels of ICT infrastructure can have a positive impact on students' achievement (Harrison *et al.*, 2002). In addition, HanneleNiemi (2003) found that while the number of computers did not increase the use of ICT by teachers, proper infrastructure remains one of the main factors of the successful integration of ICT in education.

The quantity issue should also go side by side with the quality issue. Providing schools with inadequate machines or without proper software is pointless. And apparently, there is a need for technical support and maintenance as soon as computers arrive into schools (Granger *et al.*, 2002; Hakkarainen *et al.*, 2001). Technical assistance as a key factor for implementing new innovations (Fullan, 1982). Unreliable ICT in schools is found to be be "the best innovation killer" (Hepp *et al.*, 2004, p.35). And there is a significant positive correlation between the technical assistance received by schools and their progress in implementing ICT (Byrom, 2001).

3.4   Summary

The emergence of the information age and the accelerating pervasiveness of ICT have left no choice for educational systems but to undertake educational reforms that embrace ICT. Countries are rushing in order to participate and reap the potential benefits of the knowledge-based economy. Developing countries are warned of the danger of falling further behind by allowing the digital divide to widen between them and other developed countries. With large proportion of nations' populations involved with education, education systems are believed to have a potentially a major role in the transformation of the society. Therefore, educational systems worldwide are updating themselves in order to be *compatible* with the information age by adopting ICT, which has led the Jordanian education system, as other systems in developing countries, to seek assistance from external aid in order to finance such interventions.

However, the literature has pointed out that ICT integration in educational systems is complex and its success cannot be guaranteed. This chapter has discussed various factors that might support or constrain interrupt ICT integration at all levels of educational systems.

In this chapter and that which preceded it, I presented three major challenges for ICT integration in Jordanian schools. I now move onto Chapter 4 to discuss the research design and how I went about investigating these issues.

Chapter 4

Research Design and Methodology

4.1   Restatement of Research Questions

The primary purpose of this study is the exploration of issues associated with Jordanian schools' integration of ICT. The focus on schools stemmed from a belief that schools and classrooms are the foundation of any educational intervention. It also stemmed from existing literature which warns that provision of ICT to schools and classrooms does not automatically improve teaching and learning (Granger *et al.*, 2002; Lai, 1993; Sandholtz *et al.*, 1997; Underwood, 2004); rather, that outcomes depend upon how ICT is implemented and utilised (Farenga *et al.*, 2001; Veen, 1993). But while maintaining this primary focus upon schools, the study did extend further, to the administration of schools at directorate and Ministry levels, as the investigation revealed the significance of centralised planning upon the integration of ICT in Jordanian schools.

As indicated earlier in Chapter 1 (section 3), the current study aimed to answer the question: "How does the nature of the Jordanian education system influence schools' adoption of ICT?" In order to address this question, I initially identified two levels for investigation: schools and the Ministry of Education. However, as noted earlier, the crucial role of the regional directorates of education in the ICT integration emerged during the course of the study and therefore they were included in the investigation.

This chapter presents the design which was adopted in this study in order to address the research question. The chapter commences with a discussion of qualitative approaches and then provides a rationale for adopting a case study approach within a mixed-method approach which includes a case study. Then I discuss the two phases of the study, as well as issues associated with data collection and analysis.

4.2   Qualitative approach

There are two major paradigms to orient any research approach: positivist/scientific enquiry, often represented through quantitative methods, and interpretive enquiry, often

represented through qualitative methods. The current research project is predominantly interpretive as it seeks understanding of the process of the Jordanian educational system's integration of ICT. I set out broad ideas which I wished to investigate while, at the same time, remaining attentive to issues which might - and indeed did – emerge from the data (Lincoln *et al.*, 1985; Rubin *et al.*, 1995).

As indicated earlier in Chapter 3, this study is spread across a range of fields and interests which makes it difficult to select one exclusive research approach. However, several studies which I had found most useful for my investigation were conducted under the naturalistic paradigm and implemented a qualitative approach, which was able to explore some of the complexities involved with ICT in education (see for example Proctor, 2001; Sandholtz *et al.*, 1997; Young, 2005). Given the multiple and changing factors involved with schooling in Jordan, as well as the little-explored cultural considerations, it appeared that a broad qualitative approach could be more useful for understanding the situation that would be otherwise enigmatic or confusing (Eisner *et al.*, 1990).

A naturalistic approach examines natural settings and emphasises that meanings arise from social situations and are handled through interpretive processes. This approach stresses the intimate relationship between the 'researched' and the researcher, which leads qualitative researchers to study phenomena in their natural settings (Denzin *et al.*, 1994; Marshall *et al.*, 2006). This relationship distinguishes the qualitative approach as it draws upon the belief that reality is not objective, "out there", and apart from the knower. Furthermore, the attribution of meaning is continuous as it can evolve and be revealed over time as the researcher has more engagement with participants in the study (Denzin *et al.*, 1994).

The qualitative approach has been deemed appropriate for the in-depth investigations requested in the present study because by its nature, it allows the researcher to develop understanding of the meaning or nature of others' experiences (Strauss *et al.*, 1998; Windschitl, 1998). It facilitates substantive exploration into a novel learning environment about which little is known, which was the case of ICT integration in Jordan. In addition, it enables the experiences of participants to be portrayed, and a detailed account of the context to be taken into account. The qualitative approach

enabled me to uncover intricate details about ICT integration by allowing an account to emerge which was descriptive and comprehensive (Best *et al.*, 1986; Merriam, 1998), and which was "grounded" (Patton, 1980, p.41) in the real experiences of the two schools during their integration of ICT.

4.2.1   The case study

Creswell (2003) identified five traditions where qualitative research is likely to be positioned; Biography, Phenomenology, Grounded Theory, Ethnography, and Case Study. Merriam (1998) identified case study as "an intensive, holistic description and analysis of a single, bounded unit" (p.193). It forms a qualitative research design which enables researchers to investigate a contemporary phenomenon within its natural context (Yin, 2003). It also enables researchers to investigate a bounded programme, event, activity, process or individuals (Stake, 1995). In addition, Patton (1980) pointed out that a case study satisfies three principles of qualitative inquiry; describing, understanding, and explaining. For the current study, the case study approach has been deemed most appropriate for comprehending the complexity of ICT integration within the complex educational system of Jordan.

A case study approach is characterised by the wholeness of its investigation, as it conceives the studied case as a complex entity and therefore it "is expected to catch the complexity" of such a case (Stake, 1995, p.xi). The wholeness characteristic of case study is derived from the belief that human systems "are not simply a loose collection of traits" (Sturman, 1999, p.103); rather, that the complexity of a given case makes it impossible to conceive it by the sum of its parts. For instance, while it is important for decision makers to know statistics about ICT in a given education system (e.g. the number of computers connected to the Internet), it requires more inclusive knowledge to make informed decisions about the appropriateness of development plans. Thus, the wholeness characteristic of the case study can enable the development of a comprehensive understanding of the complexity of ICT integration in a given educational context.

Nevertheless, case study has been criticised as an approach of enquiry. The external validity of case study has been criticised, that is, whether it is possible to generalise results beyond the immediate case (Tellis, 1997). However, qualitative research does

not intend to provide generalisability. As Stake (1995) puts it: "case study research is not sampling research" (p.4) as we do not study a certain case in order to understand other cases in order to accomplish a rational generalisation. Rather, the obligation is to understand a particular case in its entirety. This notion emphasises that "the real business of case study is particularisation, not generalisation" (Stake, 1995, p.8), as the power of each study lies in part in its uniqueness (Forman, 2005). However, understanding a case may offer *transferability,* as the current research may be applied to other similar contexts (Lincoln *et al.*, 1985). Moreover, *dependability* in qualitative research refers to the degree in which the research would produce the same or similar results if it is conducted by another researcher as described (Devers, 1999). However, it has been pointed out by LeCompte and Preissle (1993), that this might be problematic or even impossible if we accept that each situation and its relationships between participants are unique.

Subjectivity in qualitative research in general and in case study in particular could be overcome in several ways. Yin (2003) suggests three remedies: using multiple sources of evidence, establishing a chain of evidence, and having a draft case study report reviewed by key informants. In the present study, in order to cross-validate (Stake, 1995) and triangulate the findings of the current study, two Jordanian schools were selected as case studies. According to Patton (1980), the selection of two cases or more can provide great rewards especially when the researcher can choose these cases. The selection of two cases can increase confidence in the robustness of the theory through replicating pattern-matching (Tellis, 1997; Yin, 2003) where patterns from one case are compared with patterns in other cases.

The cases of the present study were *critical cases*. This type of case study draws upon the belief that if the studied programme does not succeed in this particular context, then it is unlikely to succeed elsewhere (Flyvbjerg, 2006; Patton, 1980). Therefore, as will be detailed below, the two schools were carefully selected to have the optimal conditions for ICT integration, because any problems faced by such schools were likely to be compounded many fold elsewhere. Each case study was made of one of the Discovery Schools from the Central Region of Jordan, and both were located in the Amman region where ICT was being intensively implemented.

4.2.2 Mixed-method approach

A mixed-method enquiry combines both quantitative and qualitative methods of research. The purpose of gathering different types of data is to understand "more fully, to generate deeper and broader insight, to develop important knowledge claims that respect a wider range of interests and perspectives" (Greene *et al.*, 1997, p.7). In this way, researchers can study a phenomenon from different perspectives and collect a variety of information which can facilitate their investigation (Creswell, 2003; Greene *et al.*, 1997; Mark *et al.*, 1997; Sandelowski, 2000; Tashakkori *et al.*, 1998). Sandelowski (2000) states that this aspect of mixed-method inquiry is a significant advantage for researchers because it can "expand the scope of, and deepen their insight from, their studies" (p.246) which can reflect upon better understanding and more warranted defensible claims (Brewer *et al.*, 1989; Mark *et al.*, 1997).

This study employed an Explanatory Sequential Design (Creswell, 2003; Creswell *et al.*, 2007) to collect, analyse, interpret and report data (Greene *et al.*, 1997). This approach starts with quantitative data collection and analysis and is followed by qualitative inquiry. However, the overall enquiry remains predominantly qualitative (Figure 4.1). Therefore, the present study is seen to be interpretive, that is, although initial design included both quantitative and qualitative approaches, the quantitative part has developed into the qualitative one.

Figure 4.1:   The Explanatory Design (Creswell *et al.*, 2007, p.73)

Now I move to discuss the two phases of the study.

4.3 Phases of the Study

As indicated earlier, the current study comprised two phases: Phase1 and Phase2.

4.3.1 Phase1

Phase1 included two questionnaires directed to teachers and principals in carefully selected schools across Jordan. The two questionnaires were crucial to providing an overview of ICT integration in the schools in the three regions of Jordan, and provided

baseline data for the research and a springboard for Phase2. Due to limitations in the current study (e.g. the distance from the field of study as well as the timeframe drawn for the study), this phase facilitated the overall investigation in two ways:

1)   by providing data from twelve carefully selected schools from the three regions of Jordan concerning teachers' and principals' experiences, attitudes, and opinions regarding ICT integration as well as providing data about each school's level of access to ICT, which guided the selection of two schools for in-depth investigation in Phase2.

2)   by examining certain factors in the participating schools. These had been identified in the literature as key factors for the success of ICT integration within educational systems (e.g. training, follow-up, and infrastructure).

Data Collection: two questionnaires

In Phase1, two questionnaires were the instruments for collecting data from teachers and principals. Questionnaires are widely used instruments for data collection because of several advantages. According to Cohen, Manion and Morrison (2003), questionnaires can provide a structured and straightforward analysis of information. Moreover, questionnaires are relatively more economical than other approaches in terms of time and money and they can be convenient for respondents as they can complete them in their own time (Sarantakos, 1993). For this study, questionnaires provided a wide range of data in a short period of time which facilitated and guided Phase2 of the study.

However, questionnaires have their inherent limitations and disadvantages. One fundamental limitation, which became evident in this study, is that questionnaires do not allow probing, prompting and clarification of questions (Sarantakos, 1993). Clearly, questionnaires make the assumption that the researcher and the respondent have a mutual understanding of the meaning of questions. However, this may not be the case. For example, despite having conducted a pilot study and with extra care paid through using teachers' first language, the investigations in Phase2, as will be discussed later, revealed clear misinterpretations of some questions by teachers.

Moreover, Cohen, Manion and Morrison (2003) highlight poor responses rates as another disadvantage of questionnaires which can skew the sample and can influence

results. In this study, I conducted the two questionnaires in person, as I handed copies to principals or appointed persons in schools and collected them in follow-up visits. This procedure ensured a 95.8% (115/120) response rate, and also enabled me to establish rapport with participants in schools during school visits. Furthermore, my visits provided a chance to explain the purpose of the study and to answer participants' questions (Best *et al.*, 1986).

Sampling and participants

Stratification was employed in selecting school samples from the three regions of Jordan; North, Centre and South. This procedure enabled the targeting of particular schools and clusters of schools from these regions. Participating schools were carefully selected from both rural and urban areas as well as boys and girls schools from each region, as the Jordanian educational system is predominantly a single-sex one (See Figure 4.2). Furthermore, the focus was on secondary schools as they were expected to be actively involved with ICT integration during the course of the current study according to the Ministry's plans (See Chapter 2, section 2.5.1).
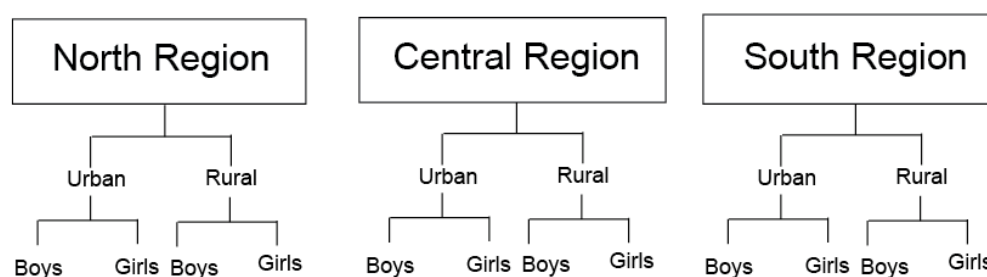
Figure 4.2:   Stratification of schools from the three regions of Jordan

A total of 120 teachers, 10 teachers from each of the 12 schools, were handed teachers' questionnaires by the principal or the appointed person in the school and were collected by the same person. In follow-up visits I collected questionnaires from the concerned person. However, in several cases I had to re-visit the school because some teachers had not completed the questionnaire. One hundred and fifteen teachers completed the questionnaire as well as the 12 principals of the participating schools. The main criterion for selecting teachers from each school was their participation in ICT professional development courses provided by the Ministry of Education. According to the Ministry of Education (2004), the teachers' population was 76,946 in 5,526 schools

during the academic year 2003/2004. Of these, according to interviews conducted with Ministry personnel, 60,000 teachers had undertaken ICDL courses and 39,000 of them had received certificates. Half the teachers were expected to have undertaken more advanced training conducted by Intel or World Links courses.

For the Central region, early contacts and investigations through mentors, principals, teachers and documents obtained from the Ministry revealed that thirteen schools had received equipment and ICT professional development courses as part of the Discovery Schools initiative. However, only six of these schools had completely functional ICT tools (i.e. math-labs, wireless technology, and laptops for mathematics teachers). Five out of the six schools were initially contacted to participate in the two questionnaires; however, the principal of one of the schools discouraged, administering of teachers' questionnaires in her school on the basis of previous experiences that teachers would not complete the survey, and therefore, this school was discarded from the study.

Pilot study

A pilot study was carried out in order to check the clarity, instruction and layout of the questionnaires. Due to my distance from the field of study, I approached teachers by means of an online forum called *Collaboration Centre* on the World Links website. I sent a large random number of emails to email addresses provided by teachers on the website. Two Master Trainers with World Links replied and were willing to help in distributing the questionnaires. As Arabic is the teachers' native language, which will be discussed later, I emailed the Arabic version of the questionnaire to 15 teachers, 12 of whom completed and returned the survey as an electronic attachment.

The 12 responses helped in reshaping the questionnaires. One item required re-wording in order to eliminate ambiguity which had emerged. In addition, it became evident that the open-ended items were generally left unanswered, which led me to re-format open ended items to be more clearly structured, easier, and faster to complete. Furthermore, other items did not seem to convey the intended meaning and these were revised.

4.3.2 Phase2

Phase2 utilised a naturalistic approach, which required me to "be there" in schools where ICT was being implemented. As indicated earlier, this approach facilitated

observing and interacting with ICT users in their natural settings. In addition, this enabled me to observe part of schools' experiences with ICT implementation. Furthermore, there was an opportunity to explore other parts of the educational system which were believed to influence ICT implementation in schools.

4.3.2.1 Selecting schools and participants

The conduct of Phase1 of this study indicated that 100 Discovery Schools were selected in Amman by the JEI in order to steer ICT integration in the Jordanian educational system. The Discovery Schools were at the forefront of ICT integration as they were meant to showcase best practices in ICT, and therefore, they were receiving extra attention from the educational system through infrastructure and professional support. Four Discovery Schools from the Central Region participated in Phase1. Two of these four schools were selected for in-depth investigation. The following criteria were employed for selecting the two schools:

- participation in ICT training courses provided by the Ministry of Education;
- ICT resources and infrastructure;
- school administration's support for ICT implementation;
- teachers' utilisation of ICT in teaching;
- positive attitudes towards ICT on the part of teachers and principals; and
- the school's willingness to participate in the study.

The two schools, **Al Fajr** and **Al Noor** were selected, as they reported having optimal conditions for ICT integration in Jordan compared with other schools, which allowed them to serve as 'critical cases' within the educational system. I selected one mathematics and one science teacher from each of the two schools because these subjects were the first to be digitised and to be facilitated by electronic materials. Mathematics curricula had been digitised for all grades (1-12) and science curricula had been the second to follow. The following criteria were employed in selecting individual teachers from the two schools:

- participation in ICT training courses provided by the Ministry of Education;

- positive attitude towards ICT in education;
- utilisation of ICT in their teaching; and
- willingness to participate in the study.

In order to understand ICT integration in the two schools more fully, the investigation extended over time to include the regional directorates of education and the Ministry of Education. In this way, the two case studies can illustrate the actual integration of ICT in schools to the educational authorities and, at the same time, they can showcase the best support that schools were receiving from the educational system during the implementation of ICT (See Figure 4.3).

Figure 4.3:   Overview of participating levels in the study

4.3.2.3   *Gaining access to the sites*

As indicated previously, I had previously been a teacher within the Jordanian Ministry of Education for two years (1994-1996). This job gave me familiarity with the educational system and its mechanisms. I still had friends and colleagues who were working for the Ministry of Education in different parts of Jordan, which helped me in gaining access to schools in order to conduct the two questionnaires during Phase1. The conduct of Phase1 gave me an opportunity to introduce myself and my research to

principals and teachers in these two schools, and it gave me further familiarity with them.

Access to Al Noor School was relatively easy. I *virtually* visited the school six months before my real visit, as I met Sami, whom will be described below, online through the electronic forum of the World Links. Since then, Sami helped me in conducting the pilot study. Three teachers from Al Noor School participated in the pilot study. I maintained my contact with Sami who was my main informant from the school in particular and my main contact in Jordan when I returned to Australia.

In regard to Al Fajr School, my access to the school was more formal. I contacted the school as a Discovery School in Amman for the conduct of the questionnaires. However, this gave me a degree of familiarity and established a degree of trust especially with the principal, and she became highly cooperative.

4.3.2.4   Data sources

The main sources of data in this study, questionnaires, interviews, and observations, were collected from:

       a)   schools

       b)   regional directorates of education

       c)   the Ministry of Education

Data collection from these three areas of the educational system is discussed next.

a)   Schools

I made two visits to Jordan during the course of this study: Visit (1) was between November 2005 and January 2006, and Visit (2) was between October and November 2006 (See Table 4.1):

Stage of data gathering	Date	Data gathering
Visit (1) to Jordan	November 2005 to January 2006	• Conduct of two questionnaires in schools and preliminary analysis • Interview (1): four teachers, two principals, and eight officials • School visits to Al Noor and Al Fajr schools and lesson observations
Prior to Visit (2)		• Analysis of questionnaires • Follow-up emails and member-check
Visit (2) to Jordan	October and November 2006	• Interviews (2): two teachers from Phase One • Interviews with two new teachers from the same schools • Lesson observation • Interviews with personnel from the maintenance department in the regional directorates
Post visit (2)		• Follow-up emails, phone calls, and member-check

Table 4. 1:   Overview of research process

I visited the two schools at least once a week at these times. The majority of my visits were arranged beforehand with principals or directly with teachers. Al Fajr School/girls required more pre-arrangement as this study was carried out by a male researcher and the principal of the school required, in most cases, my visits to teachers to be arranged through her in the beginning. However, after building trust and appreciation of the research, the principal became less strict in pre-arranging my visits to teachers at the school.

I had easier access to Al Noor School/boys, as I had established contacts with two teachers in the school during the pilot study and the principal was less strict. Therefore, I used to arrange my visits directly with teachers, without going through the administrative channels. This gave me better access to the school and more freedom for my investigation.

Documents and artifacts were also gathered from teachers and students. There included handouts, forms, electronic materials prepared and presented by teachers and students. I also wrote field notes during my visits to each school. Furthermore, I also sent follow-up emails to some participants after I returned to Australia.

The main two techniques employed for data gathering in schools were observation of lessons and interviews. The two techniques are discussed next.

Lesson observation

Lesson observation is a highly valuable technique for data collection in qualitative inquiry. This technique requires researchers to 'be there' in the real context of the research: it "offers dynamic 'slices' of classrooms" (Forman, 2005, p.109). I observed lessons in both computer labs and normal classrooms with two goals in mind:

- capturing teachers' utilisation and integration of ICT in teaching; and
- documenting ICT infrastructure and its capacity to uptake ICT.

I made detailed field notes during my observations. In addition, after each class I extended and explained my field notes in more detail and made some comments. In one case, a teacher asked for a copy of my field notes relating to his class for feedback, and I gave him a photocopy. At the end of each lesson, I asked teachers for copies of any handouts or electronic projects presented by students or the teacher during that lesson.

Interviews

Interviews provided another method for data collection in the current study. According to Stake (1995), "the interview is the main road to multiple realities" (p.64). Interviews are used in qualitative research to obtain data from different sources in order to provide different perspective at the issue of concern. The purpose of interviewing is to access the perspective of someone being interviewed (Cohen *et al.*, 2003; Patton, 1980) and according to Stake (1995), this attribute of interviewing is a point of some pride for qualitative researchers as they become able to discover and portray multiple views of a case.

Interviews were conducted face-to-face at the interviewees' workplaces. However, in one instance the interview was conducted in a quiet area in a university campus where the interviewee was studying, due to difficulty in arranging other times. At the end of each interview, interviewees were asked whether they would like to receive a transcript of the interview, and transcripts were emailed upon request. This correspondence was intended to give interviewees a chance to check the accuracy of contents. I received two emails from two participants who confirmed the contents without changes, and the rest did not comment. This procedure was especially useful because the majority of my participants did not consent to audio-tape recording the interviews. However, one participant did consent to audio-recording the interview, which I transcribed and translated from Arabic to English.

I conducted nine face-to-face interviews in the two schools in Arabic. Teachers' interviews aimed to explore their experiences with, understanding of, and expectations from ICT integration. Moreover, the principals of the two schools were interviewed, as they were key players in ICT integration at the school level. The interviews were conducted face-to-face on site at each of the principals' office. The interviews were semi-structured in nature in order to guide the discussion without being limiting. Key questions had been handed to participants during previous visits in order to allow time for reflection. Similarly, I interviewed teachers on one occasion subsequent to their lesson having been observed.

Participants from Al Fajr School/girls

The main informant from Al Fajr School was Leila, who was a biology teacher with 22 years of teaching experience. Leila had undertaken both ICDL and Intel courses, as well as advanced training in e-learning resource material, and content authoring. During Visit (1) to Jordan, she was participating in a video conferencing course provided by the Queen Rania Center. Leila was one of the early adopters of technologies in the school. That is, even before the launch of ERfKE by the Ministry of Education, Leila had bought a laptop and used it in her teaching. She was also a representative of teachers for the opening meetings of the JEI and ERfKE initiatives. Leila participated in both phases of the current study. During Visit (2) to Jordan, October-November 2006, Leila was seconded to the Administration of Curricula and School Textbooks, in the Ministry of Education, for participating in authoring new science curricula.

The second participant from Al Fajr School was Samar, who was a mathematics teacher. She had 20 years of experience and had undertaken only the ICDL course. However, Samar was pursuing ICT in teaching her subject. I was introduced to Samar by the principal during one of my visits to the school. During this visit I arranged with her for a classroom visit and a follow-up interview. According to the principal, Samar was enthusiastic about ICT and she was implementing it vigorously in her teaching. In addition, as noted above, mathematics curricula were the first to be digitised and complemented by electronic materials online for all grades.

During follow-up visits, I also had an opportunity to observe and interview two English teachers: Reem and Najah. These teachers were of the first in the country to implement the English Interactive Online (EIO) initiative, which was being pre-piloted in the school. I attended one of Reem's lesson in which Najah was also present and interviewed both of them afterward. Follow-up emails were sent to both teachers for explanation and comments.

In order to capture the administration's perspective on ICT integration, the principal of Al Fajr School was interviewed in her office.

Participants from Al Noor School/boys

I spoke to four people in the school including the principal and four teachers; however, my main informant was Sami. He was a physics teacher with 15 years of experience. He had undertaken ICDL and World Links courses. I initially met Sami online through an electronic forum on the World Links website. He regularly posted his participation to the forum. In addition, he also maintained an email *group* as well as a website. As noted earlier, Sami facilitated my access to Al Noor School when I visited Jordan. He was an advocate of using computers in teaching, especially after he had undertaken World Links course. He was also a Master Trainer with World. I attended Sami's classes and interviewed him afterward. In his classes in the computer lab, he often had other teachers who attended his classes to observe his implementation of ICT in his teaching, as he used to be called "the father of computers" in the school.

My interview with Sami attracted the attention of Yousif, another teacher who was present in the staff room as I interviewed Sami. He approached us and started expressing his negative experience with ICT. I welcomed his comments, introduced myself to him, and asked him for an interview. Yousif was a mathematics teacher with 13 years of experience. He had received a laptop from the JEI to access the e-math content. He had undertaken ICDL and Intel courses as well as other workshops. I interviewed him after my interview with Sami.

Jameel was another participant from Al Noor School. He was a mathematics teacher with 15 years of experience. Jameel expressed his support for ICT as he believed in its value for education. He also received a laptop from the JEI. I observed his lessons in the classroom and in the computer lab, and I conducted a follow-up interview after his class.

b)   *Directorates of education*

As indicated earlier, the directorates of education were included in this study as I came to realise their key role in ICT integration one which teachers and principals in schools frequently mentioned, especially in providing mentors and technical support for ICT implementation. Consequently, I widened my investigation to include two mentors from Directorate1 and Directorate2.

Because mathematics curricula had already been digitised for grades 1-12, the two mentors were selected from this subject. Both had participated in the digitisation process from the beginning and had undertaken ICT training courses. One mentor had spent a year working for the Digitisation Unit in authoring and revising the new mathematics textbooks.

Furthermore, I interviewed the head of Computers and Networking Department. The interview was conducted face-to-face at his office and audio-recorded.

c)   *The Ministry of Education*

The early stages of this study highlighted the centralised nature of the Jordanian education system and it became clear that the centre of the educational system had a great deal of influence over schools' integration of ICT. Beyond schools and

directorates, I investigated ICT decisions, implementation, and follow-up by the following departments and parties:

ERfKE

I conducted a face-to-face on site interview with Maram, the coordinator of ICT integration across the Jordanian educational system within ERfKE. Maram had extensive experience in coordinating and developing projects for ICT integration in the educational system. She was also coordinating the efforts of three major directorates within the Ministry of Education; curricula, teacher training and new policy for in-classroom examinations under ERfKE project.

Jordan Education Initiative (JEI)

As indicated earlier, the JEI was concentrating on 100 Discovery Schools in Amman which were being used as a test-bed for ideas and programmes that could then be rolled out nationally under ERfKE especially in regard to ICT integration. I conducted on site face-to-face interview with the coordinators of *E-curricula* and *In-classroom technologies* tracks in the JEI. Interviews were carried out in the Ministry of Information and Communication Technologies where the JEI was located.

Electronic Training Unit

The Electronic Training Unit is part of the Administration of Training and Educational Development in the Ministry of Education. It oversees ICT training courses and designs training courses for staff members countrywide. In addition, the Unit was coordinating ICT training courses. I conducted a face-to-face interview with Omar, the head of the unit, as well as with Waleed, whom I met during the process of arranging for my interview with Omar, and who was a trainer on one of the ICT training courses.

Digitization Unit

The Digitization Unit was a part of the Administration of Curricula and School Textbooks which was responsible for overseeing the development of new textbooks that integrate ICT, and which coordinated training for teachers on the new digitised materials. The Administration was also responsible for authoring and endorsing new

textbooks. I arranged for an interview with the head of the Unit. However, due to his commitments, he appointed in his place his assistant, Dr Basil, who had been with the Unit since its establishment.

Development and Coordination Unit (DCU)

This unit was established according to a agreement between the World Bank and the Ministry of Education. It was responsible for coordinating efforts between the Ministry of Education and World Bank, the major loan body for the ERfKE project. The Unit also had a follow-up role, as it was requested to report to the World Bank regarding the progress of ERfKE implementation. I conducted a face-to-face interview with Justin, head of the Unit, who was an overseas expert.

Documentation analysis and online sources

Documents as well as artifacts were collected from teachers, students, mentors, and other participants. According to Granger *et al.* (2002), review of documents adds to the depth and breadth of data collected, as this provides an additional perspective on what being observed. Participants, especially from the Ministry, also provided access to unpublished documents regarding ICT integration.

I monitored and documented teachers' postings to an electronic forum provided on the World Link website (see: http://www.world-links.org/discuss). Emails were also sent to some participants for further enquiries and clarifications. This was the only interactive website available in Jordan for teachers who had undertaken ICT training.

4.4 Triangulation of data

In the current study, triangulation was achieved in three ways: type of data, data sources, and data analysis.

Firstly, triangulation was sought through the kind of data collected. That is, data collected in each phase, Phase1 and Phase2, triangulated each other. In Phase1, data were collected through two questionnaires distributed to teachers and principals. During Phase2, I had the opportunity to ask participants to expand and clarify some answers

they had provided to the earlier questionnaires, especially in respect of questions that revealed misinterpretation by participants.

Secondly, triangulation was sought through a diversity of data sources, which comprised collected from teachers and principals in schools, as well as other stakeholders and officials from the regional directorates of education and the Ministry.

Thirdly, triangulation was sought during and after data analysis where findings were compared and interrogated within the research itself (from Phase1 and Phase2) and with other findings in previous studies. In addition, I shared some of my findings with some participants in order to benefit from their perspectives on the data.

4.5   Language issue

The language issue is believed to have been significant in the current study. I undertook the two questionnaires as well as the interviews (except the interview conducted with Justin in English) in Arabic, while all other stages of the study I undertook in English. Therefore, extreme care was paid to ensure accuracy of translation, and interpretation between English and Arabic versions. The English versions of questionnaires, interviews, information sheets, and consent letter had to be provided in English to my university's Ethics Clearance Committee. Therefore, they were all initially designed and developed in English, peer-checked and approved by experts. Then, these documents were translated into Arabic by a professional translator. To ensure the accuracy of the Arabic version, all documents were then translated back to English by a third party in order to reveal any conflicting statements or terms in the process of translation. Minor differences were discovered between the Arabic and English versions and these were resolved.

4.7   Data analysis

For the two questionnaires, there were two stages of analysis. The first was a preliminary analysis during data collection when I used the Statistical Package for the Social Sciences (SPSS) in order to guide the selection of two schools and teachers for Phase2. The second stage of analysing the questionnaires included comparisons of

results between schools and the three regions of Jordan. However, simple descriptive frequency tabulation was the main means for analysing the two questionnaires.

For the qualitative phase, it was crucial to identify the unit of analysis. Brewer and Hunter (1989) define units of analysis as "those entities *about* which we collect data and about which we want to generalise or make inferences" (p. 109, italic in source) and therefore, they define what the case is. In this study, the unit of analysis was the school, which implied examining the uptake of ICT by the school and how the overall context of the school can influence ICT adoption. In addition, the analysis examined the school as a unit within the larger context of the educational system and how this influences a school's adoption of ICT.

Thematisation and categorisation were used to make sense of the data collected during interviews, observations, and school visits during Phase2. Themes and patterns were matched and compared between the two case studies. However, for the final discussion of findings, I integrated both quantitative results and qualitative findings in order to confirm/disconfirm, cross-validate, and gain in-depth understanding (Creswell, 2003; Tashakkori *et al.*, 1998) of ICT integration in Jordan. The findings then were compared with other studies.

4.8   Ethical considerations

Clearance for the study was obtained from the University's Human Research Ethics Committee (No. 87-2005). In addition, another approval was obtained from the Jordanian Ministry of Education to ensure the applicability of the research beforehand. However, when I started visiting schools, I was required to obtain another clearance from the regional directorates. After obtaining this level of clearance, I started contacting school principals in order to arrange my school visits.

The directorates' approvals were shown to principals in each participating school. An information sheet (Appendix C) was also handed to each participant in the case studies, as well as to interviewees at the system level, in order to give a clear idea about the study and their roles and rights as participants. Furthermore, participants were asked to sign a consent letter. In one case, a principal was willing to complete the questionnaire

and to be interviewed, but she refused to sign a consent letter (Appendix D). In order to protect confidentiality pseudonyms were used in both phases of this study.

4.9   Limitations and considerations

The tyranny of distance from the field of study as well as the limited timeframe created practical constraints during the course of this study. This enticed me to adopt a mixed-method approach. However, although this approach enriched the study by providing a wide range of data, it did at the same time disperse my efforts across various procedures and analysis.

Despite the careful selection of the two schools as *critical cases* in Jordan where the integration of ICT was most active, generalisation could not be made to other schools in the country as each school has its own unique context. Moreover, the current study was conducted in parallel to the early implementation of ERfKE, and therefore, there was no chance to observe the final achievements of the first phase of the project (2003-2008). Furthermore, as previously noted, there exist very few published studies which examine ICT in Jordan.

4.10 Summary

This chapter outlined the methodology and research design for this study. Both quantitative and qualitative approaches were utilised in order to capture ICT integration in the Jordanian educational system from several perspectives.

Chapter 5 will follow by presenting findings from teacher and principal questionnaires conducted in Phase1 of the study.

Chapter 5

ICT Presence in Jordanian Governmental Schools

As noted in Chapter 4 (section 4.3.1), the utilisation of questionnaires in Phase1 enabled the current study to gather a wide range of data from a large sample from the three regions of Jordan. In addition, the careful selection of the sample allowed incorporating school where ICT was being actively implemented. Furthermore, the review of the literature enabled me to identify a range of factors, which are presented in this chapter, that are believed to have direct impact on ICT integration.

This chapter presents results emerging from Phase1 of the study. Phase1 aimed to examine the presence of ICT in a sample of 12 purposefully selected schools from the three regions of Jordan - North, Central and South - during the implementation of ERfKE. As discussed in Chapter 4, Phase1 has served this study in two main ways: firstly, Phase1 aimed to provide a general overview of ICT presence in the selected schools. Therefore, data collected during this phase was obtained from schools that were expected to be engaged in ICT integration according to the Ministry's plans. This phase focused on issues regarding schools' preparedness to adopt and integrate ICT. Secondly, the preliminary analysis from Phase1 provided guidance for Phase2 of the study by narrowing the investigation in order to select two schools as critical case studies for in-depth investigation.

One hundred and fifteen teachers completed teachers' questionnaires out of the 120 in the total sample. The questionnaires collected data about teachers' experiences, practices, and beliefs with respect of ICT integration in the selected schools. Principals completed a different questionnaire, which collected data about the administration's perspective on ICT integration, as well as school aspects.

As indicated in Chapter 3, a review of the literature identified several factors relating to ICT integration at the several levels of educational systems. Phase1 examined two clusters of issues at the school level:

(i)   Factors related to teachers' adoption of ICT; and

(ii)   Factors related to school's context which can influence ICT integration

These two clusters are presented next.

5.1 Factors associated with teachers' adoption of ICT

This section presents findings related to factors associated with teachers' adoption and implementation of ICT. As discussed earlier in Chapter 3, factors relating to teachers themselves have been identified in the literature as principally: (i) ICT competence and (ii) attitudes towards ICT classroom integration. Next, I present findings from teachers' and principals' questionnaires regarding these two areas.

5.1.1 Teacher Competence

There is agreement in the literature that teachers need to master ICT skills which will enable them to use technology effectively in their teaching, and increasingly it is acknowledged that a key factor in successful implementation is teachers' own professional development (Downes *et al.*, 2001; Farenga *et al.*, 2001; Fiszer, 2004; Fullan *et al.*, 1991; Guskey, 2000; Mathew *et al.*, 2002; Strudler *et al.*, 1999).

5.1.1.1   ICT Training in Jordan

As noted earlier in Chapter 2 (section 2.5) the Jordanian Ministry of Education adopted four main professional development courses for ICT, namely, ICDL, Intel Teach to the Future, World Links, and iEARN. The courses aimed to improve teachers' ICT proficiency at three levels: ICT skills, pedagogical skills, and curriculum training (Alutaibi, 2003). While ICDL focused on improving teachers' ICT skills, including word processing, spreadsheets, and surfing the Internet, Intel and World Links were the main courses for introducing teachers to pedagogical use of ICT. In addition, iEARN aimed to encourage collaboration and interaction between teachers and students with their peers worldwide by means of ICT.

Participation

Participation in the four ICT courses was greatly varied among teachers from the three regions of Jordan. The ICDL course was the most widespread of all, with least variation across regions compared with all other courses. One hundred and thirteen (98.2%) teachers reported undertaking the course, of whom 38 (97.4%) in each of the Central and the North regions, and 39 (100%) in the Southern Region. On the other hand, the iEARN course had a substantially lower profile, with only 2 (1.7%) teachers among all participants reporting undertaking the course. Furthermore, the World Links course showed high presence in the Central region, as 12 (30.7%) teachers reported having undertaken this course, while none of the teachers from the South region reported undertaking it, only 4 (10.2%) teachers from the North region (Table 5.1).

Table 5.1 also shows that Al Fajr, Al Noor and Al Salam schools from the Central region, which will be further investigated in Phase2, reported high participation in Intel and World Links as well as ICDL. Al Fajr School reported high participation in the Intel course with 7 teachers having undertaking it. However, none of the teachers from that school reported undertaking either World Links or iEARN. On the other hand, 4 teachers reported undertaking World Links course from Al Noor School and 5 from Al Salam School, and these were the largest proportions of teachers among all schools.

It may thus be seen apparent that the ICDL course was most consistently taken up by participating schools across all three regions, while World Links and Intel were better represented in the Central and North regions. However, this can be understood in light of the mechanism of disseminating the reform across the Jordanian educational system, which it starts from the Central Region where the centre of the education system is located, before it spreads to other regions.

	Central Region					North Region					South Region					
	Al Fajr	Al Noor	Al Salam	Al Urdon	*No. (39)*	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	*No. (39)*	Al Qalam	Al Seel	Al Alam	Al Rayah	*No. (39)*	*Total/ 115*
ICDL	11	7	12	8	**38 (97.4%)**	6	7	12	11	**36 (92.3%)**	10	10	10	9	**39 (100%)**	*113 (98.2 %)*
World Links	0	4	5	3	**12 (30.7%)**	2	1	1	0	**4 (10.2%)**	0	0	0	0	**0 (0%)**	*16 (13%)*
Intel	7	3	3	1	**14 (35.8%)**	3	7	6	2	**18 (46.1%)**	7	4	2	1	**14 (35.8%)**	*46 (40.8%)*
iEARN	0	1	0	0	**1 (2%)**	0	1	0	0	**1 (2%)**	0	0	0	0	**0 (0%)**	*2 (1.7%)*

Table 5.1:   Number of teachers participating in ICT training courses

ICT skills and pedagogical skills

As discussed earlier, ICT training courses usually target two levels of teacher' ICT skills: ICT skills, and pedagogical use of these skills. Predictably, as the vast majority of teachers all the three regions reported undertaking the ICDL course (Table 5.1), Table 5.2 shows that 88 (76.5%) teachers reported developing computer skills (e.g. Word processing, presentation and accessing to information). However, only 58 (50.4%) reported developing pedagogical skills from ICT training.

Furthermore, it seemed that teachers from the Southern Region were more likely to develop computer skills than both the other two regions, as 33 (84.6%) of them reported developing such skills. However, 20 (51.2%) teachers from the Central and 23 (58.9%) from the Northern regions reported developing pedagogical skills compared with 15 (38.4%) from the Southern. This tendency might be due to World Links and Intel courses which were concentrated in the Central region before expanding to the Northern and Southern regions, as was already demonstrated in Table 5.1 above.

	Central Region					North Region					South Region					
	Al Fajr	Al Noor	Al Salam	Al Urdon	*No. (39)*	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	*No. (39)*	Al Qalam	Al Seel	Al Alam	Al Rayah	*No. (39)*	*Total/ 115*
Computer skills (e.g. Word processing, presentation and access to information)	8	5	8	7	**28** **(71.7%)**	2	7	10	8	**29** **(74.3%)**	7	10	8	8	**33** **(84.6%)**	88 *(76.5%)*
Pedagogical skills (Using ICT in teaching subjects)	5	4	6	5	**20** **(51.2%)**	6	5	9	3	**23** **(58.9%)**	6	4	3	2	**15** **(38.4%)**	58 *(50.4%)*

Table 5.2: Number of teachers reporting skills they developed from ICT training

Teachers' utilisation of ICT

As a result of ICT training, Jordanian teachers are expected to practise their newly developed skills in teaching. Table 5.3 shows that teachers from all three regions reported the greatest use of ICT use was searching for additional teaching resources. In addition, 52 (45.2%) teachers reported searching for additional sources on the Internet and 37 (32.1%) reported using ICT to prepare for lessons. Nevertheless, ICT-based interaction in the school culture appeared to have minimal presence among teachers, as only 5 (4.3%) teachers reported using ICT for communication and 13 (11.3%) of them reported uploading files (e.g. lessons) to the Internet. This might be linked to the availability and quality of Internet connection in schools (see section 2.1 below).

Overall, teachers from the Central Region reported the highest use of ICT among teachers from all regions. Twenty-two (56.4%) teachers from this region reported searching for additional sources on the Internet compared with 15 (38.4%) from both the North and South regions. Nevertheless, the use of Internet and the World Wide Web for communication remained low in the Central region, as only 3 (7.6%) teachers reported using ICT for communication. Teachers from Al Fajr and Al Noor schools reported greater use of these two functions of ICT than did teachers from all other schools in the study.

	Central Region					North Region					South Region					
	Al Fajr	Al Noor	Al Salam	Al Urdon	*No. (39)*	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	*No. (39)*	Al Qalam	Al Seel	Al Alam	Al Rayah	*No. (39)*	*Total/ 115*
Preparing lessons	3	4	3	5	**15 (38.4%)**	1	2	1	4	**8 (20.5%)**	5	2	3	4	**14 (35.8%)**	*37 32.1 %*
Searching for additional sources on the Internet	6	6	6	4	**22 (56.4%)**	6	2	3	4	**15 (38.4%)**	3	4	7	1	**15 (38.4%)**	*52 45.2%*
Uploading files to the Internet (e.g. lessons)	2	3	1	0	**6 (15.3%)**	1	1	2	1	**5 (12.8%)**	1	0	1	0	**2 (5.1%)**	*13 11.3%*
Communication (e.g. emails and chat rooms)	1	1	0	1	**3 (7.6%)**	1	0	0	0	**1 (2.5%)**	1	0	0	0	**1 (2.5%)**	*5 4.3%*

Table 5.3: Number of teachers who self-reported practising ICT skills after ICT training courses

Time and timing of ICT training

Time and timing of ICT training have been identified in the literature as crucial factor for the success of ICT professional development. On one hand, enough time should be allocated for teachers to participate in training, and on the other, enough time should be allowed for teachers to practise their newly developed ICT skills in their classes (Downes *et al.*, 2001). Furthermore, the timing of training courses should be suitable for teachers, and should not exploit teachers' non-work time (Galanouli *et al.*, 2004; Gilmore, 1995; Mathew *et al.*, 2002).

Teachers in this study stressed that heavy workload and limited time are major factors which impede their desire to implement ICT properly. One teacher noted, for example, *it is unrealistic for the teacher to search for other materials than the textbook if his/her workload is more than nine lessons a week.* (Q1:85) Another wrote,

> Using and activating the computer needs time for preparing the digitised materials, and we, the teachers, suffer from the tightness of time and the pressure from work. *(Q1:110)*

One teacher proposed *reducing teacher's workload in order to be able to prepare for [his/her lessons] on the computer.* (Q1:36) Another proposed

> Giving teachers enough time to be able to show techniques the teacher learnt by using computers to teach students in an innovative and interesting way apart from the tradition. *(Q1:49)*

Moreover, in regard to time allocated for training courses, only 49 (42.6%) teachers from the three regions of Jordan believed that it was enough to develop new ICT skills. Table 5.4 shows that 17 (43.5%) from the Central Region, and 16 (41%) from both the North and the Central regions, believed that the time was enough for them to develop new ICT skills.

	Central Region					North Region					South Region					
	Al Fajr	Al Noor	Al Salam	Al Urdon	*No. (39)*	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	*No. (39)*	Al Qalam	Al Seel	Al Alam	Al Rayah	*No. (39)*	*Total/ 115*
Was the time of training enough to develop new ICT skills?	6	5	3	3	**17 (43.5%)**	3	2	7	4	**16 (41%)**	6	4	4	2	**16 (41%)**	49 42.6 %

Table 5.4:   Number of teachers reporting their satisfaction with the time given for ICT training

Sixteen teachers commented on issues regarding time and timing of ICT training courses. The timing issue appeared to be of significance especially to female teachers. Understandably, making training after school hours or during holidays can be at the cost of teachers' own time. The timing of training was problematic as it was usually conducted after school hours or during holidays. Usually, teachers from the three regions of Jordan travel between half and one hour to central locations in major cities of each of the 36 directorates where ICT training is conducted. Therefore, female teachers may find it difficult to maintain a balance between their family commitments and their professional live. Thus, the majority of comments were provided by female teachers and there was a request from teachers to make training courses during the school day and to consider training as part of teacher's workload. One female teacher wrote:

> […] The only comment is that, there are new courses are available for teachers regarding information and communication technologies, but the timing of the courses is the problem especially for teachers who are out of the centre of the district. *(Q1:110)*

In another female teacher's words:

> The timing of training courses should be suitable as well as the place of training and its distance from teachers' living. Training should also be considered as part of teacher's workload. *(Q1:75)*

Another female teacher commented:

> The place where training takes place and its distance from where one lives should be suitable. Training should be considered as part of the teacher's working hours. *(Q1:36)*

Modes of ICT training courses

Several issues are identified in the literature regarding the mode of training including: the location of training, starting points of courses, and skills taught (Downes *et al.*, 2001; Fiszer, 2004; Guskey, 2000; Mathew *et al.*, 2002; Strudler *et al.*, 1999). In addition, as teachers are expected to implement skills that they develop from ICT training in classrooms, training should ensure a direct link between these skills and their implementation in real teaching environments. Browne and Ritchie (1991) as well as Granger *et al.* (2002) stressed that learning isolated skills can have little

impact on classroom practices if training courses do little to help teachers to transfer these skills to classrooms.

Participant teachers in this study commented on several issues regarding their ICT training. Teachers expressed their frustration about both the physical environment and the quantity of machines. Some teachers were asking for more space as the *rooms were very crowded* (Q1:116). In addition, teachers asked for *more machines* to be able to practise what they learn during their courses (Q1:121) as *the number of computers was not enough which causes teacher's frustration* (Q1:116). In one teacher's words,

> There should be an opportunity for all trainees to be trained on each skill they are taught; that each trainee should practice by himself on machines so all peripherals [computers, data projectors, scanners…] should be available. *(Q1:41)*

Another teacher wrote:

> The role of training [courses] would become greater if they are implemented in classrooms during practicing teaching, because the purpose of this training is implementing the computer in teaching. *(Q1:3)*

Furthermore, the location where teachers receive ICT training is believed to reflect upon their ability to transfer skills into classrooms during their teaching. The comments provided by teachers on the location of ICT training can be understood in the context of Table 5.5, which shows the places where teachers received ICT training in the three regions of Jordan. One hundred and ten (95.6%) teachers reported receiving ICT training in computer labs. However, only 3 (2%) received ICT training in classrooms, one teacher from each of Al Noor, Al Urdon, and Al Karamah schools.

	Central Region					North Region					South Region					Total/ 115
	Al Fajr	Al Noor	Al Salam	Al Urdon	*No. (39)*	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	*No. (39)*	Al Qalam	Al Seel	Al Alam	Al Rayah	*No. (39)*	*Total/ 115*
Classroom	0	1	0	1	**2** **(5.1%)**	0	0	1	0	**1** **(2.5%)**	0	0	0	0	**0** **(0%)**	*3* *(2 %)*
Lecture room	0	0	1	0	**1** **(2.5%)**	0	0	0	0	**0** **(0%)**	0	0	0	0	**0** **(0%)**	*1* *(0.8%)*
Computer Lab	10	6	11	8	**35** **(89.7%)**	6	8	13	11	**38** **(97.4%)**	10	8	10	9	**37** **(94.8%)**	*110* *(95.6%)*

Table 5.5: Number of teachers reporting receiving ICT training in classrooms, lecture rooms, or computer labs

The literature recommends that ICT training should consider individual differences between teachers in terms of their previous knowledge of ICT (Galanouli *et al.*, 2004; Gilmore, 1995; Rosen & Michelle M. Weil 1994). In the present study, 71 (61.7%) teachers from the three regions of Jordan indicated that ICT training courses took into account their previous knowledge, and 25 (64%) teachers from each of the Central and North regions indicated that their previous knowledge was considered by ICT training courses (See Table 5.6). Nevertheless, this indicates that a large proportion (38.3%) of teachers believed that their previous knowledge was not considered by training courses. According to one teacher, *training courses do not consider the individual differences. Some teachers do not know how to turn on the computer.* (Q1:80)

	Central Region					North Region					South Region					
	Al Fajr	Al Noor	Al Salam	Al Urdon	*No. (39)*	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	*No. (39)*	Al Qalam	Al Seel	Al Alam	Al Rayah	*No. (39)*	*Total/ 115*
Did ICT training courses consider your previous knowledge?	8	4	8	5	**25** **(64.1%)**	6	6	9	4	**25** **(64.1 %)**	5	4	9	3	**21** **(53.8%)**	*71* *(61.7 %)*

Table 5.6: Number of teachers reporting considering whether their existing knowledge had been considered in ICT training courses

Follow-up to training

As indicated in Chapter 3, section 3.2.3, follow-up has been identified as a major ingredient of any successful ICT integration in education, because it helps teachers to make sense of their newly developed skills in light of their own practices in classrooms (Bradshaw, 2002; Fiszer, 2004; Lewis, 1998). As Fiszer (2004) notes, teachers might abandon their newly developed skills if they find them "incompatible" with real teaching/learning settings.

Teachers commented on the lack of follow-up for ICT training in Jordan and frequently requested follow-up to training. As one teacher wrote: *teachers must receive follow-up in the field when they implement technology.* (Q1:1) However, Table 5.7 shows that only 36 (31.3%) teachers reported receiving follow-up for ICT training: 16 (41%) teachers from the South Region, compared with 10 (25.6%) and 9 (23%) from Central and North regions, respectively. Moreover, only 29 (25.2%) of those who received follow-up believed it was adequate for them to transfer ICT skills to classrooms. However, this finding might be linked to the distance of the South Region from the centre of the education system where mentors, especially from the Central and the North regions were, often removed from their duty to reinforce other field such as authoring and training, as will be discussed later.

Twenty-nine (74.3%) teachers from the Central Region reported receiving follow-up after training and only 10 (25.6%) believed that the follow-up was adequate to transfer ICT skills to classrooms (Table 5.7). Al Fajr and Al Noor schools reported receiving more follow-up than any of the other Central Region, and teachers in those two schools showed more satisfaction with their follow-up. However, as we will see in Chapter 6, these apparently positive responses were due to teachers' misinterpretations of the term "follow-up" used in the questionnaire. That is, investigation in Phase2 showed that teachers reported visits to schools by officials and stakeholders as being "follow-up".

	Central Region					North Region					South Region					Total/115
	Al Fajr	Al Noor	Al Salam	Al Urdon	*No. (39)*	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	*No. (39)*	Al Qalam	Al Seel	Al Alam	Al Rayah	*No. (39)*	Total/ 115
Did you receive any follow- up?	3	4	2	1	**10 (25.6%)**	1	1	2	5	**9 (23%)**	5	3	5	3	**16 (41%)**	36 (31.3%)
Was the follow-up adequate to transfer skills to classrooms?	6	4	1	0	**11 (28.2%)**	1	1	4	2	**8 (20.5%)**	2	2	3	3	**10 (25.6%)**	29 (25.2%)

Table 5.7:   Number of teachers reporting receiving follow-up after ICT training

Collaboration and interaction

Teachers' interaction and collaboration in schools can improve their adoption and implementation of ICT (Fiszer, 2004; Sandholtz *et al.*, 1997; Wenger, 1998). Through these activities, teachers may learn new skills from one another and verify their competence by reflecting on their own practices. Furthermore, teachers may overcome daily problems regarding implementation of ICT by working with more experienced colleagues who might be able to offer scaffolding of ICT skills both during and after training.

All principals (100%) from participating schools indicated that they facilitate collaboration amongst teachers (Table 5.8). in addition, 99 (86%) teachers from the three regions reported increased collaboration with other teachers as a result of their ICT training courses. Teachers from the South Region reported greater collaboration (36 teachers [92.3%]) compared with 34 (87.1%) and 29 (74.3%) from Central and the North regions, respectively. In addition, teachers from the South Region reported having more opportunities to observe other teachers when implementing ICT, with 11 (28.2%) reporting doing so compared with only 6 (15.3%) and 7 (17.9%) from the North and the South. Nevertheless, only 24 (20.8%) teachers from the three regions reported having observed other teachers during implementing ICT (Table 5.9).

	Central Region					North Region					South Region						
	Al Fajr	Al Noor	Al Salam	Al Urdon	**Sub-Total**	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	**Sub-Total**	Al Qalam	Al Seel	Al Alam	Al Rayah	**Sub-Total**	*Total/ 12*	*%*
I facilitate teachers' collaboration	✓	✓	✓	✓	4	✓	✓	✓	✓	4	✓	✓	✓	✓	4	*12*	*100*

Table 5.8: Principals' responses about facilitating teachers' collaboration in schools

	Central Region					North Region					South Region					
	Al Fajr	Al Noor	Al Salam	Al Urdon	*No. (39)*	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	*No. (39)*	Al Qalam	Al Seel	Al Alam	Al Rayah	*No. (39)*	*Total/ 115*
I collaborate with other teachers	8	6	11	9	**34 (87.1%)**	3	8	11	7	**29 (74.3%)**	10	9	9	8	**36 (92.3%)**	*99 (86%)*
Have you ever observed other teachers using ICT in their teaching?	3	3	0	1	**7 (17.9%)**	1	1	3	1	**6 (15.3%)**	3	2	2	4	**11 (28.2%)**	*24 (20.8%)*

Table 5.9:   Number of teachers reporting collaboration and interaction with other teachers during ICT implementation

5.1.1.2 *Belief in the potential of ICT*

The literature has demonstrated that teachers are more likely to adopt ICT when they are convinced of its benefit for their teaching and students' achievement (Downes *et al.*, 2001; Grunberg *et al.*, 1992; Lai, 1993; Means, 1994; Subhi, 1999). Therefore, educational interventions should dedicate time and effort to convince teachers of the benefits of ICT for teaching and learning.

Teachers reported major changes as a result of undertaking training courses. Table 5.10 shows that 110 (95.6%) teachers from the three regions reported becoming more aware of the benefits of ICT after undertaking ICT training. Furthermore, teachers reported major changes in their instructional strategies as a result of ICT training, with 94 (81.7%) teachers indicating that their instruction had improved as a result of ICT training. In addition, 95 (82.6%) participant teachers believed that their teaching became more student-centred as a result of their ICT training. These findings were also confirmed by principals' accounts. Thirteen (92.8%) principals believed that teachers who had undertaken ICT training became more effective in their teaching as a result of their training. In addition, 10 (71.4%) principals believed that ICT teacher training was reflected positively in students' achievement.

Overall, teachers from all three regions reported highly positive impacts of ICT training on their attitudes towards ICT and upon their instructional methods. However, these positive outcomes need to be seen alongside a number of shortcomings, which were noted earlier and which will be further explored in the following sections.

	Central Region					North Region					South Region					
	Al Fajr	Al Noor	Al Salam	Al Urdon	*No. (39)*	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	*No. (39)*	Al Qalam	Al Seel	Al Alam	Al Rayah	*No. (39)*	*Total /115*
More aware of the benefits of ICT	11	6	11	9	**37 (94.8%)**	6	8	11	11	**36 (92.3%)**	10	10	9	8	**37 (94.8%)**	110 *(95.6%)*
My teaching has improved	8	5	8	9	**30 (76.9%)**	5	6	12	7	**31 (79.4%)**	9	9	9	7	**34 (87.1%)**	94 *(81.7%)*
My teaching is more student-centred	10	5	10	9	**34 (87.1%)**	5	7	11	6	**29 (74.3%)**	8	9	9	6	**32 (82%)**	95 *(82.6%)*

Table 5.10:   Number of teachers reporting belief and instructional changes as a result of participating in ICT training

5.2   School Factors

This section presents findings related to factors associated with the school context and its integration of ICT. As noted earlier in Chapter 3, these factors relate to school leadership, ICT infrastructure, and computers' location in schools.

5.2.1 School leadership

The literature emphasises the crucial role of school leadership in ICT integration across education, and shows how leadership can hinder or facilitate school members' adoption of ICT (Earley *et al.*, 2004; Fink, 2005; Fullan, 1993; Fullan, 2003b; Reynolds *et al.*, 2000; Richardson, 2005; Tyack *et al.*, 1994).

One hundred and five (95%) teachers from the three regions indicated that their administrations were supportive of ICT integration, and that support was generally linked to principals' belief in the usefulness of ICT. Indeed, there was support of and satisfaction with ICT training courses among principals from the three regions. Eleven (91.6%) principals from the three regions believed that ICT training courses reflected positively upon teachers' instruction. Furthermore, 11 (91.6%) principals believed that teachers became more collaborative and more effective after ICT training. In addition, all principals (100%) believed that teachers had become more effective after undertaking ICT training and 8 (66.6%) of them believed that ICT training reflected positively on students' achievements (Table 5.11).

	Central Region					North Region					South Region						
	Al Fajr	Al Noor	Al Salam	Al Urdon	**Sub-Total**	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	**Sub-Total**	Al Qalam	Al Seel	Al Alam	Al Rayah	**Sub-Total**	*Total/ 12*	*%*
ICT training courses reflect positively on teachers' practices	✓	✓	✓	✓	4	✓	✓	✓	✓	4	✗	✓	✓	✓	3	*11*	*91.6*
Teachers became more confident after ICT training	✓	✓	✓	✓	4	✓	✓	✓	✓	4	✓	✓	✓	✓	4	*12*	*100*
Teachers are more collaborative after ICT training	✓	✓	✓	✓	4	✓	✓	✓	✓	4	✗	✓	✓	✓	3	*11*	*91.6*
Teachers become more effective after ICT training	✓	✓	✓	✓	4	✓	✓	✓	✓	4	✗	✓	✓	✓	3	*11*	*91.6*
Teachers' ICT training reflected positively upon students' achievement	✓	✗	✓	✓	3	✓	✓	✓	✗	3	✗	✓	✗	✓	2	*8*	*66.6*

Table 5.11:   Principals' views on the impact of teachers' ICT training

Nevertheless, ICT take up was still slow among principals themselves. Six (50%) principals indicated that they did not use the Internet regularly. In addition, only 3 (28.5%) principals reported that they had ever contacted either teachers or parents via email. Surprisingly, no principals from the Central region had ever used email to communicate with either teachers or parents, despite the fact that ICT integration in Jordan started in this region, and that these schools were of the first to be provided with Internet connection (Table 5.12).

	Central Region					North Region					South Region					Total/12	%
	Al Fajr	Al Noor	Al Salam	Al Urdon	**Sub-Total**	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	**Sub-Total**	Al Qalam	Al Seel	Al Alam	Al Rayah	**Sub-Total**	*Total/12*	*%*
I use emails to communicate with teachers	✗	✗	✗	✗	0	✗	✗	✗	✓	1	✗	✓	✗	✓	2	*3*	*25*
I use emails to communicate with parents	✗	✗	✗	✗	0	✗	✗	✗	✓	1	✗	✓	✗	✓	3	*3*	*25*
I use the Internet regularly	✓	✗	✗	✓	2	✗	✗	✓	✓	2	✗	✓	✗	✓	2	*6*	*50*
I am able to help teachers while using ICT	✓	✗	✗	✓	2	✓	✓	✓	✓	4	✗	✗	✗	✓	1	*7*	*58.3*

Table 5.12:   Principals' answers regarding their own ICT competence and utilisation

5.2.2 infrastructure

A large body of literature indicates that access to ICT is a prerequisite for its integration and adoption by school members (Byrom, 2001; Dimmock, 2000; Downes *et al.*, 2001; Granger *et al.*, 2002; Hakkarainen *et al.*, 2001; Hepp *et al.*, 2004). Although there is no consensus in the literature about the ideal ratio of computers to students in schools, the provision of adequate access to ICT is clearly vital (Dimmock, 2000).

The overall ratio of students to computers in all the participating schools from the three regions was 15.1/1. However, this ratio was greatly varied among these schools. Table 5.11 shows that while Al Wefaaq School from the North Region had a ratio as low as 6.6/1 students to computers, it was as high as 21.5/1 in Al Seel School from the South Region. However, the low ratio in Al Wefaaq School was due to the school being a centre of excellence where both students and teachers are selected carefully, and where resources are more plentiful than elsewhere.

The Central Region reported a 15.3/1 overall ratio of students to computers, the highest among the three regions (Table 5.13). However, this could be explained by the higher student population in the Central Region compared with the other two regions, as the total of students in the four schools from this region was 3601, compared with 2515 and 1164 in the North and the South, respectively. Furthermore, even among the Central Region, the ratio was greatly varied: while Al Fajr School had a ratio as low as 10.7/1 students to computers, Al Salam School had a ratio of 20/1.

Furthermore, a reasonably fast connection is a prerequisite for teachers and students to access the digitised materials which were available online. However, as Table 5.13 shows, access to the Internet was greatly varied among schools from the three regions. The Central Region reported having 136 computers connected to the Internet, while the South Region reported having only 6 connected computers. Nevertheless, teachers complained about the quality of Internet speed. According to one teacher,

> Although the available training courses are well-prepared and good but the technology is inadequate to achieve what teachers are trained for.

The network is very slow and could not cope with the connected schools leave alone if the number of connected computers increased. In fact, if schools would use the Internet as hoped for, the network would be totally down. (Q1:118)

	Central Region					North Region					South Region					
	Al Fajr	Al Noor	Al Salam	Al Urdon	**Sub-Total**	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	**Sub-Total**	Al Qalam	Al Seel	Al Alam	Al Rayah	**Sub-Total**	*Total*
Number of students	798	1000	1200	603	**3601**	500	400	715	900	**2515**	138	388	500	138	**1164**	*8933*
Number of computers	74	60	60	40	**234**	45	60	60	60	**225**	13	18	45	8	**84**	*225*
Number of computers connected to the Internet	39	40	20	37	**136**	0	20	23	20	**63**	0	6	0	0	**6**	*225*
Ratio of students to computers	10.7/1	16.6/1	20/1	15/1	**15.3/1**	11.191	6.6/1	11.9/1	15/1	**11.1/1**	10.6/1	21.5/1	11.1/1	17.2/1	**13.8/1**	*15.1/1*

Table 5.13:   Access to ICT in the participating schools

5.2.3 Computers' location in schools

The location of computers in schools can determine the ease of access to these machines by teachers and students. In particular, teachers' and students' utilisation of ICT can be restricted when access is confined to computer labs.

As Table 5.12 illustrates, access to computers in the majority of schools was in fact restricted to computer labs. Only Al Fajr and Al Noor schools from the Central Region reported having computers in both computer labs and classrooms. However, as we will see in Chapter 6, the computers located in classrooms were laptops brought in by teachers for their own use, rather than desk-top computers which could be used by students.

Teachers expressed the need for more access to ICT especially outside computer labs. In one of the teachers' words … *I believe that we need computers, data projectors, and scanners in classrooms* (Q1:43), while another teacher asked for *making computer labs available for all subjects all the time.* (Q1:6) One teacher also wrote: *we need computers in classrooms to be able to teach some of the new digitised curricula with efficiency and ease.* (Q1:59)

	Central Region					North Region					South Region						
	Al Fajr	Al Noor	Al Salam	Al Urdon	*Sub-total /4*	Al Wefaaq	Fatima	Al Karamah	Al Sabeel	*Sub-total /4*	Al Qalam	Al Seel	Al Alam	Al Rayah	*Sub-total /4*	*Total/ 12*	*%*
Computer lab	✓	✓	✓	✓	4	✓	✓	✓	✓	4	✓	✓	✓	✓	4	*12*	*100%*
Classroom	✓	✓	✗	✗	2	✗	✗	✗	✗	0	✗	✗	✗	✗	0	*2*	*16.6 %*

Table 5.14:   Number of Schools which reported having computers in computer labs and classrooms

5.3   Summary

Chapter 5 has presented an overview of ICT integration in 12 purposefully selected schools from the three regions of Jordan: North, Central, and South. Data for this chapter relied on two questionnaires distributed to teachers and principals in the selected schools. The two questionnaires concentrated on factors identified in the literature as crucial for ICT integration at the school level. The findings were represented in two main categories: factors associated with teachers and factors associated with the school context.

Due to the location of the Central Region and its proximity to the centre of the educational system, schools from this region reported having better access to ICT. However, even within this region, there were significant differences in schools' access. In several respects, Al Fajr and Al Noor schools, reported having relatively better access than other schools in the region. These were the only two schools to have computers in classrooms as well as in computer labs (albeit for teachers' use only) and to have a reasonable number of computers connected to the Internet. Furthermore, the two schools were part of the Discovery Schools initiative, which gave them extra advantages in terms of follow-up and infrastructure (e.g. laptops for mathematics teachers and wireless technology in schools). In particular, Al Fajr School reported having optimal conditions for ICT integration compared with other schools from all regions of Jordan.

In the next two chapters, 6 and 7, the study will proceed to investigate ICT integration in Al Fajr and Al Noor schools.

Chapter 6

Case Studies and Issues Arising

The primary purpose of this study was to investigate the Jordanian educational system's integration of ICT. Building upon, and in conjunction with the findings from Phase1, this study proceeded to select two case studies for further and in-depth investigation in two purposefully selected schools. The case studies explored teachers' and principals' experiences and understanding as well as the overall integration of ICT in each of the two schools. However, this phase also revealed the importance of institutional factors which lay outside the schools themselves, and therefore, the investigation extended to involve regional directorates of education and the Ministry of Education.

Merriam (1998) notes that there is no standard format for reporting case study research. For the purpose of this study, I will start by discussing each of the two case studies, giving details of my interactions with participants from each school. This aims to provide a vivid picture closely linked to the discussion of issues which arose from the investigation.

This chapter, along with Chapter 7, discusses issues emerging from investigations at the several levels of the educational system. In this chapter, I present issues relating to ICT integration within the school context. The discussion in this chapter will include issues relating to schools' implementation of ICT as well as issues associated with teachers' adoption of ICT. Chapter 7 will follow by examining a further set of issues associated with the regional directorates of education levels and the Ministry of Education.

Following is an overview of the two schools involved in this study and a description of their main features. The chapter continues by discussing issues which emerged from the investigation in the two schools.

6.1 Background of the two schools

6.1.1 Al Noor School/boys

Al Noor School was my first school for in-depth investigation where I had relatively easy access through friends who introduced me to the principal and other school members. In addition, having conducted the two questionnaires in person during Phase1 facilitated my access to the school and gave me a degree of familiarity. A teacher in the school first introduced me to the principal, who had two years in teaching and five years as a principal. I briefed him about the research and handed him my Information Sheet, which provided details of the research as well as the directorate of education's approval for conducting the research. A computer was on the principal's desk and there were six chairs for visitors. While I was present in the principal's office, he sometimes got busy typing students' names on the computer and entering their marks, as schools had been given a deadline to upload their results to the Eduwave portal.

The principal introduced me to two visitors who at that time were on an evaluation visit to the school regarding the e-math curricula. One visitor was from the company that was responsible from developing the e-math, the other was from the Directorate of Curricula and Textbooks, a member of the team authoring new curriculum for mathematics. These visitors with the principal had planned to visit a "digitised class" and they invited me to join them. Without hesitation, I agreed and we attended the class. It was a trial class where the mathematics teacher was implementing the newly developed e-contents. The two visitors were writing their comments to be sent to the developing company.

During my second visit to the school, the principal was absent, so I waited for my participant at the deputy principal's office which had no ICT. Teachers were coming and going during the five-minute recess which started and ended by the ringing of bells. Shortly, my participant arrived and we headed towards the library to conduct the interview. However, the library was closed, and so the teacher suggested the teachers' room, this was a spacious area where teachers spend their non-teaching time during the school day. I had not been to a teachers' room in Jordan for over than nine years and I was expecting to see changes, but surprisingly, there were no noticeable changes

whatsoever: the room was in the traditional format with tables, chairs and a few old closets, with a complete absence of ICT.

Al Noor Schools is located in a wealthy neighbourhood and surrounded by lavish houses which reflect the socio-economic background of its students. The school is located in the capital, Amman, and so it is within the vicinity of the Ministry of Education and the regional directorate. During my study, this particular school was involved in several programmes and initiatives. The school had two teachers as Master Trainers with World Links programme and over half of the school's teachers had undertaken this programme. One teacher was undertaking a High Diploma course in ICT which had been made available for limited number of teachers in the country. The school frequently received evaluation visits by authors and developers of the new e-contents as part of evaluating the new E-math. The school was also being visited by both local and international officials and other stakeholders, as it was one of the early implementers of the Ministry's reforms and one of the Jordan's 100 Discovery Schools.

As a Discovery School, Al Noor was being infused extensively with ICT as a test-bed for the new reform. It had 1000 students and 40 teachers with ratio of 16.6/1 students to computers, which compares with a 21/1 ratio in Jordan as a whole (World Bank, 2003b). The school had nine laptops from the Jordan Education Initiative although seven of these were non-functional. The school had Asymmetric Digital Subscriber Lines (ADSL) and wireless connection. Computer laboratories provided the only access to computers, intranet and the Internet. Furthermore, the school had sixty desktop computers. There were three labs, each of which contained 20 computers, a printer, a scanner, a data projector, a whiteboard, and speakers connected to the main computer. Only two computers were located outside the labs, one at the principal's office and another in the science lab. The latter was being used for storing files and it was Pentium I. Forty of the school's computers had Internet connection.

Furthermore, the school was one of the few schools, even amongst the Discovery Schools, where new curricula are first pre-piloted and then piloted before rollout. Teachers in the school were requested to send feedback to the authors of the new

digitized curricula as well as to the companies that develop the e-contents. So, teachers here were among the first to be exposed to the new curricula, and the school was a major source of feedback for the Ministry of Education regarding new initiatives.

The classrooms themselves, however, were overcrowded, with a narrow aisle between desks, and no enough room for teachers to walk between students' rows. Teachers spent most of the time standing in front of students lecturing using chalkboard as the most and foremost instructional aid (See Figure 6.1). Given this overcrowding and layout, it would not be possible to introduce additional elements such as computers. Although some teachers had received laptops in order to use them in classrooms, the two participants in this study who had received laptops did not use them during my visits because the machines were non-functional and needed maintenance.

Figure 6.1:   Inside a classroom in Al Noor School

Nine months later, in October 2006, I visited Jordan for the second time, when I was able to make several visits to Al Noor School. As reform was being implemented, it was my desire and anticipation to document any changes or development regarding ICT integration. One of these visits coincided with a visit made by the regional director of education to the school, and later I was informed by Jameel, one of my participants, that the visit was in preparation for a conference to be held within the next few days. The conference was organised by the JEI and aimed to showcase the progress of the reform to aid organisations to "keep funding", as some news had leaked out that attention might be shifting away from Jordan, due to a belief amongst some organisations that Jordan had "had enough". So, the conference was intended to promote achievements made since the reform started in 2003, and thereby convince donors and aid agencies to continue their support.

It was clear that Al Noor School had undertaken major changes. On my second visit, I met Majid, the new principal, as Ali, the previous principal, had left the school. I briefed Majid on my research and the role of his school in it. It was clear to me that he did not have the same interest as his predecessor in research about ICT. Nevertheless, he gave me permission to directly contact my participants in the school. In addition to Ali, three staff members had left the school since my first visit: Sami, Yousif and Nedal, the computer lab coordinator. Nedal's position had been vacant for three months. Although Sami had left the school, I was able to reach him for a short follow-up interview at his new workplace. Jameel was still teaching in the school.

Since Visit (1) nine months earlier, the city of Amman had signed an agreement with the City of Chicago as part of a *Sister Cities* project, and Al Noor School was one of the two schools to be twinned with another two schools from Chicago. In earlier follow-up emails post-Visit (1), my informant expressed teachers' enthusiasm at the school and their high expectation from this project. Disappointingly, in the six months which had passed since the agreement was endorsed there had been no communication between the two schools, despite Al Noor's attempts to contact its twin school in Chicago.

I spoke to five people in the school including the principal and four teachers; however, my main informant was Sami, who was a physics teacher of 15 years' experience. His response to the survey in Phase1 indicated that he had undertaken ICT professional development courses and that he had a positive attitude towards ICT in education. He was a regular user of the Internet, and maintained a high profile on the electronic discussion board "Collaboration Centre" which was available for teachers who participate in the World Links course. He frequently posted to this website while discussing issues with others. In addition, the pattern in which he responded to my emails indicated that he was a regular and a frequent user of ICT. He had also become a supporter of ICT in education, especially after he had undertaken World Links course. He was a Master Trainer with World Links, and one day a week, on Thursdays, he was released from teaching in order to train teachers in other schools as part of the World Links programme. In addition, he maintained a large email list online, as well as having maintained his own website.

My interview with Sami attracted the attention of another teacher, Yousif, who was present in the teachers' room at the time of one of my visits. He approached us and started talking about his negative and disappointing experiences with ICT. I welcomed his comments, introduced myself to him, and asked him to elaborate. As a mathematics teacher, Yousif had received a laptop. However, he expressed his frustration with and criticism of the poor maintenance and the time wasted trying to get the laptop fixed through the directorate of education. In addition, he expressed frustration about the time available for him to develop his ICT knowledge, as he had a second job after hours.

Another participant was Jameel, a mathematics teacher. The information he provided on the questionnaire indicated that he was a supporter of ICT who believed in its usefulness in education. Jameel had been supplied with a laptop by as part of JEI. I arranged to visit him in one class and interviewed him afterwards. Jameel, too expressed his frustration in having received a laptop which was not functional.

During my visits to the computer labs, I met Nedal who was the computer lab coordinator in the school. Both teachers and the principal indicated that Nedal was

competent and cooperative with teachers and students when they used the computer labs. During my presence, lessons in his presence were running smoothly without technical disruption. However, when he was not present during lessons, noticeable delay occurred due to technical and networking problems.

6.2.2 Al Fajr School/girls

Al Fajr School was my second school for in-depth investigation. I entered from the main entrance which leads to a playground when I was approached by a male gatekeeper. I introduced myself, and then he introduced me to Hiba, the principal, who was having a chat with fellow female teachers in the playground. She had a badge revealing her name and position in the school. It was a simple sign but for me it meant a lot more. Hiba was the first and the only principal among all those I met during my fieldwork who took care to attend to such details. I introduced myself and received a greeting in a professional manner. After that we went straightaway to the administration office. It was a large room with the principal's desk at the end of it and a computer placed at a desk at the other end rather than on the principal's desk. Unlike other principals, Hiba asked me to give her a copy of the approval from the directorate of education, which her school belongs to, for conducting the research. I briefed her about my research and handed her the Information Sheet, which provided extra information. She had fifteen years of experience in administration and twelve years in teaching. I noted that the deputy principal's office also had a computer and a printer.

The streets leading to the school are lined with luxurious houses in a wealthy neighbourhood. The school also has an advantageous proximity from the centre of the educational system and other educational partners. It used to take me less than five minutes walk from the school to the regional directorate of education. The school is also located within one kilometre from the Ministry of Education. The Queen Rania Centre, which provided schools with access to Internet and intranet as well as some training courses, was also in the immediate vicinity of the school.

Unlike Al Noor School, Al Fajr School had 798 students and 54 teachers with ratio of 14.7 to1, which is a low ratio even by international standards; and compares with a 21/1 ratio in Jordan as a whole (World Bank, 2003b). The school had 74 computers which were located in four computer labs, the library, science labs, and the administration office (see Table 6.1). Two mathematics teachers had also received laptops through the Jordan Education Initiative. In addition, the school had ADSL and wireless connection, as well as four data projectors, mainly in the computer and science labs. Classrooms were in the traditional form with students sitting in rows and teachers lecturing them using white or blackboards without any presence of ICT. While the main access to computers was in computer labs, small numbers of computers in science labs, library and the administration office also provided extra access. Science labs were large, and each lab had one section for science experiments and an adjunct theatre for presentation. The theatre had one computer and a data projector as well as a printer, speakers, a scanner, and a whiteboard.

	Number of teachers	Number of students	Number of computers	Ratio of students to teachers	Ratio of students to computers
Al Noor	40	1000	60	16.6/1	25/1
Al Fajr	54	798	74	10.8/1	14.7/1

Table 6. 1: A comparison between Al Noor and Al Fajr schools in terms of teachers, students, and computer numbers

Furthermore, at Al Fajr students and teachers enjoyed large space in classrooms due to their relatively smaller numbers of students per class. Compared to other schools, classrooms at Al Fajr School were not crowded, with an average of 30-35 students per class (Figure 6.2).

Figure 6.2:   A lesson in progress at the Al Fajr School

All teachers in the school had undertaken the ICDL course and various staff had participated in the Intel course. During the course of this study, five teachers were participating in a training course provided by the Queen Rania Centre which focused on integrating video-conferencing in teaching and learning. Such courses were available only to a small number of teachers. The principal mentioned that through her *good relationships with officials within the Ministry and the Queen Rania Centre* (Hiba, December 7, 2005), that this number of teachers from her school had been assigned to that course.

Soon it became clear to me that conducting research in this school was not something unusual. The school was presented by the education system as a model of "school excellence" to visitors and stakeholders. The principal recalled a few names of researchers who had undertaken research in the school. During my visits to the school I also met another researcher who was conducting his research at the same time.

Al Fajr School was an active participant in educational reform. As a Discovery School, it was among the few schools in the country to participate in pre-piloting and piloting stages of the new curricula. As noted for Al Noor, teachers in the school were of the first to be exposed to the new curricula, and the school was a major source of feedback for the Ministry of Education regarding new initiatives.

During the conduct of the two surveys for Phase1, I suggested to the principal that her school might be selected for further in-depth investigation. As a result of preliminary analysis of the questionnaires' responses, I selected two teachers; Leila and Samar, whose answers revealed that they had undertaken several ICT training courses and who had positive attitudes towards the integration of ICT in their teaching.

Nine months later, I visited Al Fajr School in order to observe some of the developments in the school in respect to ICT integration as well as those which involved new participants. Even though it was a long time since my last visit to the school, the site was familiar and I did not need to introduce myself again as the principal was still the same person whom I had met before. She introduced me to a new English Interactive Online initiative which was being pre-piloted in the school. Of all the staff members, only one, Leila, had transferred out of the school, in this case to the Department of Curricula and Textbooks to participate in authoring the new curricula.

Leila was a biology teacher with 22 years of experience in teaching. She had undertaken both ICDL and Intel courses. Moreover, she had undertaken more advanced training in coaching, E-learning resource material, and content authoring. During the time of conducting this study, she was participating in another advanced programme in the Queen Rania Centre which included video conferencing. She was a representative for teachers at the opening meeting of the Jordan Education Initiative (JEI) and the ERfKE reform project. In later interviews, I found out that Leila was one of the early adopters of technologies in the school. She had bought a laptop to use in her teaching even before the Ministry of Education launched the ERfKE.

Samar was a mathematics teacher with 20 years of experience. However, she had undertaken only the ICDL course. I was introduced to Samar by the principal during one of my visits to the school. The principal also praised Samar's enthusiasm and effort to integrate ICT in her instruction, which had included encouraging teachers to digitise lessons from their textbooks. During this meeting I arranged with the teacher to visit her classroom and to meet for a follow-up interview.

My other two participants from Al Fajr School were Reem and Najah with 13 and 14 years of experience respectively. Both teachers had undertaken ICDL and Intel courses. Both were English teachers, and both were involved in pre-piloting a new initiative called English Interactive Online (EOI). These two teachers were among the first teachers in the country to implement the EOI initiative. I attended one class where both were present, and interviewed each of them afterward.

6.2   Main features of ICT in the two schools

The literature points to several factors that influence ICT integration across educational systems including teacher preparedness and willingness, professional development, school leadership and infrastructure. As noted earlier, Chapter 5 represented data collected through investigating the presence of the previously identified factors in purposefully selected schools from the three regions of Jordan. Next, issues will be presented as they emerged from the investigations during Phase2 of the study, supported by detailed accounts and observations on the part of participants.

While the previously identified factors from the literature for successful ICT integration were also carefully examined during Phase2, I remained attentive to local and contextual factors as they were experienced by participants in this study. Following are the main two categories of factors: teacher factors and school factors, and a discussion of how they influenced ICT adoption and integration in the two participating schools.

6.3.1 Focus on teachers

This section will discuss issues which seemed to influence teachers' adoption of ICT. As discussed in Chapter 3, section 3.1, teachers themselves, and their preparedness and willingness to adopt ICT, are increasingly considered as central to ICT integration across educational systems. Following are the main issues associated with teachers' adoption of ICT, as they emerged in this phase of the study, and they comprise: teacher belief in the potential of ICT, teacher resistance, teacher competence, ICT professional development, and teacher workload.

6.3.1.1 Teacher belief in the potential benefits of ICT

A large body of literature has studied the impacts of teachers' beliefs and their attitudes towards ICT on its integration across educational systems. Teachers' acceptance of any new technology in education has come to be a key factor for the adoption of this technology (Grunberg *et al.*, 1992; Means, 1994; Subhi, 1999). Veen (1993) found that while school factors (e.g. infrastructure, leadership) played a major role in how teachers made use of computers, teacher-level factors (belief and skills) outweighed those factors in explaining teachers' use of ICT. According to Higgins and Moseley (2001), teachers view educational change through the lens of their own beliefs and thinking, and therefore, teachers need to think in new ways about students, subject matters, and the teaching-learning process in order to adopt ICT.

Phase1 of this study found that 95.6% of participant teachers believed in the potential benefits of ICT for their profession. In line with these findings, Phase2 emphasised this positive attitude towards ICT among teachers, with an overwhelming majority of participants expressing their belief in the potential of ICT for enhancing education outcomes, and only one teacher being a critic of this approach.

Al Noor School

Sami, from Al Noor School, summarised the transformation of his attitude towards ICT in one of his early postings to the electronic discussion board on World Links website as follows:

> For me, learning how to use the computer was stressfull [sic], because I thought it will be very hard, and I thought that it will need a computer engineer to turn on the computer. However, when I started my course I found out that it's really easy and it suit every body, and I learned most of what I know now just by playing on the computer and practicing over and over. And the most intersting [sic] thing happened when one of my friends interduced [sic] me to the Internet, and it was a new era for me. it did really changed my point of view in many aspects. (Sami, May 27, 2004. *posted in English*)

In late 2005, he acknowledged that he was *very enthusiastic and even partial to technology*. One of the teachers in the school called him *"the father of computer"* because he used computer labs frequently and always supported ICT integration. Although he had not received a laptop, as a mathematics teacher he regularly used computer labs, indicating that such use occurred *at least once a week* (Sami, December 30, 2005).

In a clear sign of commitment, Sami used to take his students to computer labs after school hours. He said that he asked for permission from the administration and from parents to do so *because there is no chance to teach students additional skills during school hours.* In addition, he mentioned that he

> helped other teachers to overcome some downfalls of technology via the Internet by instructing them through emails and answering their questions. (Sami, December 30, 2005)

In the school, other teachers used to visit Sami during his classes in the computer labs. Each time I attended his classes in the computer labs there were other teachers who were attending his class to learn from him, some of whom were from subjects other than mathematics. The observations were self-motivated by these teachers in order to *see how he [Sami] uses technology in his teaching and to learn from that.* (OBNS.1, an English language teacher who was attending the class) Sami himself pointed out that through such occasions *teachers try to learn from each other in a collaborative way.* (Sami, December 30, 2005)

However, as indicated above, Yousif was against ICT in education. Unlike Sami, he was a mathematics teacher who had received a laptop from the Jordan Education Initiative as part of the e-math; however, this did not change his belief, especially after his struggle with maintenance. He said bluntly:

> Honestly, I am against technology in education; from my experience with the e-math I have noticed that my students' achievements were affected negatively by the digitization. (Yousif, December 30, 2005)

Although his stance contradicted all other accounts made by participants in this study even in the same school, Yousif proceeded to explain why he opposed the integration of ICT in his teaching. He stressed that a successful implementation of ICT requires additional time for preparing activities and simply he did not have that time:

> I could not rely on the wage I receive for being a teacher, so I have another job after school hours to be able to support my family, and to be honest with you, I have noticed that my students' achievement has dropped since I started to use the computer in my teaching. (Yousif, December 30, 2005)

Due to the low income, teachers are pushed by their family responsibilities to find a second job, which is usually private tutoring after school. Jameel also mentioned this financial reason behind his decision in recent years to work after school hours:

> After three months of chasing for the laptop to be fixed, they wanted to fine me… we are hidden soldiers [teachers] and we need support, well, now I finish school and go straight to my other job. It is private tutoring because, I swear, we are not able to cope. Before three years I never though of private tutoring, but now it is getting hard and you could not cope without a second job. (Jameel, 15 November 2006)

Al Fajr School

Leila, from Al Fajr School, was an example of the enthusiasm and positive attitude amongst teachers towards ICT. She said that she used computer labs at least once a week. In addition, she cited an example of commitment to using ICT:

> I bought a laptop on my own and used it in classrooms even before ERfKE started in 2003, even before computers were made available for the school. That time laptops were large and heavy

and because I used to carry my laptop with me most of the time, I started to have shoulder and back pain. I think technology is very useful for education and the decision by the ministry of education to integrate technology into education was a wise decision but the important thing is how we go about implementing the decision. Any reform is nothing if it is not implemented properly. (Leila, December 7, 2005)

Samar, too, although she had undertaken only ICDL courses, was enthusiastic to try ideas regarding ICT. She was engaging her students with activities by asking them to digitise lessons and chapters from textbooks of all grades. The teacher could not hide her smile of pride when she brought a large portfolio which contained her work with her students. The portfolio comprised colour-printed presentations and floppy disks. In this case, we see how a teacher was able to adopt ICT in her instruction even without having received formal training in the pedagogical use of ICT.

6.3.1.2 *Teacher resistance*

Teachers are sometimes blamed for the slow pace of ICT integration across educational systems (Lai, 1993), and are sometimes accused of resistance or ill-preparedness to handle ICT in their teaching (Fullan *et al.*, 1996).

Findings from Phase1 of this study showed that the overwhelming majority of teachers believed in the potential benefits of ICT for their profession. Nevertheless, some administrators of the education system did blame teachers for the slow pace of ICT integration, and their blame sometimes was echoed at the directorate level. Mentors from Directorate1 and Directorate2 cited teachers' resistance as an obstacle to change. In addition, Basil from the Digitisation Unit, within the Ministry of Education, referred to teacher resistance to reform as a roadblock for the integration of ICT. Kawsar, from the Jordan Education Initiative, indicated that *teachers' resistance to change is also a big challenge for the reform.* (Kawsar, December 25, 2005)

Ziad gave an explanation for teacher resistance saying:

there is fear from using computers by teachers; fear of not being able to use it [the computer] or getting humiliated in front of students. (Ziad, November 2, 2006)

6.3.1.3   *Teacher competence*

It is believed that teachers competence in dealing with ICT and their capacity to use it properly in their instruction are vital for any meaningful ICT use (Cochran-Smith, 2004; Rudd, 2001; Spellings, 2005; Zhao, 2003).

Even within the same school, teachers were widely different in their capacity to integrate and use ICT. In Al Fajr School, despite Samar's remarkable efforts to utilise ICT in her instruction, the essence of the integration was not clear for her. She misinterpreted the overall purpose of ICT integration as she was preoccupied by some of its superficial aspects. As noted earlier, Samar was working with her students on *digitizing lessons and chapters from textbooks*. The task comprised assigning students with the help of the teacher to reproduce printed lessons into digital format as slideshow presentations. Then, the presentations were saved on floppy desks and printed on coloured-paper. (OBFS: 1) Students received 10% of their final mark for this activity. Both electronic and printed materials are *compiled in one large portfolio* (Samar, December 8, 2005). In addition, Hiba indicated that students involved were the ones who had to pay for printing and they were *willing to spend on these activities as long as they receive high marks in the end.* (Hiba, December 11, 2005). At the same time, Samar did not have an email account, which indicates that she did not use ICT for communication, and which casts a doubt on the range of skills students were able to develop as a result of their interaction with the teacher. In particular, the ultimate goal of the reform was to prepare students for the knowledge economy which places high emphasis on *teamwork, communication skills, ethics and honesty, computer skills, critical thinking, problem-solving and multi-languages* (Maram, November 6, 2005). However, when teachers such as Samar do not practice and utilise these skills, they are less likely to be able to pass them on to students.

On the other hand Leila, from the same school, engaged her students with a wide variety of resources and instructional materials. During one of her classes she used a data projector, whiteboard, a large illustration of *general life cycle of a Moss*, a microscope, a

real frond of a fern, and a book that contained extra pictures and details about ferns. Her students demonstrated high levels of ICT skills and used them purposefully. Students had been asked to prepare for the lesson about *ferns* and they did their own research on the Internet and in the school's library. Students presented their research as a slideshow as the teacher was standing next to them providing assistance when needed. (OBFL:1)

Leila was aware that *ICT integration is not achieved merely by converting textbooks to electronic books* (Leila, December 7, 2005). For her, the essence of ICT integration goes deeply to changing teachers' and students' roles in teaching and learning, as

> the teacher becomes a guide and supervisor and not the only source of information for students and the student to be able to find a piece of information from resources other than the teacher.
> (Leila, December 7, 2005)

Leila's students demonstrated excellent ICT skills including using computers and the Internet, setting up and connecting devices for their presentation, and utilising their skills in using search engines on the Internet to obtain extra information. Furthermore, students were encouraged to present their information in a variety of ways. In addition to presentations, students produced brochures about ferns using MS Publisher package. Another student drew upon Macromedia Flash as a resource. All projects showed a deep understanding of the content as well as skills in using ICT. Leila shared the teaching responsibility with students who became more responsible for their own learning. At the end of the class she referred to *Google* search engine on the Internet and encouraged students to do their own searches. She also gave students 10% of their subject's final mark on presentation and research. (OBFL:1)

Moreover, Leila understood the downsides of ICT. She usually backed her lesson up so she did not have to rely entirely on ICT. Technology for her *is great when it is up and running*, *but still it can be embarrassment and a problem when it does not work.* Therefore, Leila prepared two forms of the same lesson, one in a digital format using the Internet and PowerPoint presentations and the second was slides to be used with the overhead projector as *the Internet may be down, the machine could be broken or even the*

software itself can be faulty. From her own experience she *could not rely completely on technology so, I need to be prepared when technology fails.* (Leila, December 7, 2005) The downside of ICT was evident in the time wasted in both Jameel's and Reem's classes, where each teacher wasted one-third of the 45-minute classes trying to overcome technical or connection problems (OBNJ:1, OBFR:1)

In Al Noor School, Sami also demonstrated a high level of understanding and implementation of ICT in his instruction. In the computer lab, Sami distanced himself from lecturing and he acted as a supervisor for students while they were exploring. He showed excellent skills in classroom management which enabled him to have time for supervising groups and individual students. In addition, he rarely lectured the whole class. Rather he assisted each group, unless it was an issue that could be worthwhile for all students, and then he required all the class to pay attention (OBNS:1). Sami, too, was aware of the downside of ICT, and therefore, he used to download and save the e-contents he intended to use. He wanted to be ready, *in case there might be a failure the Internet connection at the time of the class so I can use the materials offline.* (Sami, December 30, 2005)

Jameel, on the other hand, had his attention focused on reproducing examples and exercises from the textbook as presentations. He provided me with a project called "The Talking Book" which was a presentation about the *Circle*. The electronic presentation presented examples and explanations about the circle using the teacher's own voice. This presentation was a traditional lecture but in a digital format (OBNJ:1).

6.3.1.4   Teacher ICT Professional development

Without adequate and on-going professional development for teachers, all other efforts for ICT integration would be futile (Baylor *et al.*, 2002; Donlevy, 1999; Downes *et al.*, 2001; Dwyer *et al.*, 1991; Rodrigues *et al.*, 2003; Rosen & Weil, 1994; Strudler *et al.*, 1999). This belief has become even stronger in the information age where changes are happening at a high pace and there is high priority to keep professionals, including teachers and principals, and abreast of changes happening around them (Lewis, 1998). In addition, in order to be effective, professional development should be embedded in a

notion of teachers as continuous learners (Downes *et al.*, 2001; Fiszer, 2004; Guskey, 2000; Mathew *et al.*, 2002; Strudler *et al.*, 1999)

As detailed in Chapter 2, section 2.5, the Ministry of Education adopted several ICT professional development programmes in order to prepare teachers for ICT integration, namely, ICDL, World Links, Intel Teach to the Future, and iEARN. The ICDL course focuses on providing teachers with ICT skills, while Intel, World Links and iEARN, focus on the pedagogical use of ICT. The courses were cascaded across the Jordanian educational system through the regional directorates.

Participants in both schools expressed their satisfaction with the Ministry's efforts to train teachers in ICT. Both principals agreed with the statement "Teacher training has reflected positively upon students' achievement" during Phase1 of this study. Ali, Al Noor's principal, mentioned that since digitisation had been introduced, *students' achievement has improved and the early results of digitisation are encouraging.* (December 15, 2005). Ali added that he *noticed that technology training for teachers have reflected positively on their practices and eventually on students' achievement.* However, while both principals expressed their satisfaction with what the digitisation brought to their schools, both of them expressed the need for more training to be provided for teachers. Hiba believed that *the current teacher training is not enough to change teachers' practice* (Hiba, December 11, 2005). This echoed earlier findings in Phase1 of the study which indicated that although 98% of participants had undertaken the ICDL course, 24% requested more training in ICT skills.

Sami and Jameel, from Al Noor School, indicated that training courses helped them in developing new skills as well as changing their perception about ICT. Jameel noted that: *the available training courses for teacher such as ICDL and World Links have helped me in using technologies.* (Jameel, 15 November 2006) Furthermore, mentors who had undertaken these courses stressed their value. Rajab, a mentor who had undertaken some of these courses, admitted that he himself

> rejected technologies in education when they were first introduced
> but after I have learned about them and having undertaken ICDL

and other courses, and after I learned and practiced by myself, I am a big supporter now. (Rajab, December 8, 2005)

Sami also explained how World Links course helped him in utilising ICT:

…last year when I took the world links course, I learned how to get the benifet [sic] of my knowledge in computer and the Internet, and how to get them with me in the classroom. It was very intersting [sic] doing most of the work with the computer, It did gave [give] a new meaning for the job and how it must be done. (Sami, May 27, 2004. posted in English)

The benefits of the available training courses were also echoed in other parts of the system. Justin, the head of the Development and Coordination Unit, expressed his confidence in these programmes saying that *there are many programmes available for professional development and teachers are receptive to them* (Justin, December 13, 2005).

Nevertheless, there was a consensus that the *cascade model was not very successful* (Omar, January 2, 2006) in distributing courses from the Ministry of Education to schools through the regional directorates. Basil, from the Digitisation Unit, had his own disappointing experience with the cascade model:

[..] I designed a training course and it was to be delivered through cascade. When I visited schools after the implementation, I found that what was being implemented by local trainers was different from what we really meant, I found fundamental changes had happened during transmitting the course. Cascade is not useful and wastes the content of the course. (Basil, December 13, 2005)

The ranking and rewards system implemented by the Ministry of Education became attached to ICT professional development courses. The ICDL course, for example, became a prerequisite for teachers to proceed on the ranking system. Teachers also had to undertake either Intel or World Links for higher ranking. All teachers from both Al Fajr and Al Noor schools had undertaken the ICDL course, which introduces teachers to basic ICT skills. However, the two schools reported varied participation in Intel and World Links courses, which introduce teachers to pedagogical use of ICT (See Table 6.3). Four (57%) participant teachers from Al Noor School in Phase1 reported undertaking World Links course, while there were none from Al Fajr School. In addition, 7 (64%)

participant teachers from Al Fajr School reported undertaking Intel Teach to the Future course compared with 3 (43%) from Al Noor School. Only one teacher from Al Noor school reported undertaking the iEARN course.

	Al Fajr (N=11)	Al Noor (N=7)	Total	%
ICDL	11	7	18	100%
World Links	0	4	4	44.4%
Intel	7	3	10	55.5%
iEARN	0	1	1	5.5%

Table 6. 2:   The participation in ICT professional development courses by teachers from Al Fajr and Al Noor schools (N=18)

Nevertheless, participants criticised several aspects associated with ICT professional development courses provided by the Ministry of Education. The criticism was mainly related to the practicality of the training courses including the following issues:

a)   Mode of ICT training

b)   The role of teacher trainers

c)   Follow-up and ongoing support

d)   School culture and teachers' interaction

e)   Motives and incentives

Following is a detailed discussion of these five issues.

a)   *The mode of ICT training*

Training courses should have clear aims and strategies to achieve these aims. Contents, time, location, as well as the way of distributing a professional development course within the system have to be addressed. When teachers undertake new ICT courses they are expected not only to develop knowledge but also to accomplish a level of autonomy and confidence in using this technology in classrooms (Granger *et al.*, 2002). The aims of the course have to be clear; in the first instance, whether the goal is to provide teachers

with ICT skills or skills for the pedagogical use of ICT (Downes *et al.*, 2001; Tawalbeh, 2001). Moreover, the location of the course has to be considered - whether it is a computer room, a classroom or even a lecture room - as this can reflect upon the transferability of newly acquired skills by teachers to classrooms (Granger *et al.*, 2002). Furthermore, in order for teachers to be able to make sense of what they learn during ICT training courses, they should be given the opportunity to have hands-on practice during training courses (Downes *et al.*, 2001; Gilmore, 1995; TeleLearning, 1999), and to have enough time afterwards to practise on their own (Strudler *et al.*, 1999).

ICT professional development needs to be of significant length (Gilmore, 1995) as one-time workshops are unlikely to develop sustainable skills (Mathew *et al.*, 2002). Furthermore, training courses should not exploit teachers' own time (Galanouli *et al.*, 2004).

There were frequent complaints, especially among female teachers, about the timing and location of training:

> The place where training takes place and its distance from where one lives should be suitable. Training should be considered as part of the teacher's working hours. (Q1:75)

This remark was prompted by teacher training courses which were conducted mainly after school hours or during holidays.

Teachers also complained about having to make their own way to training sessions. The location of courses certainly meant that teachers from other regions were required to travel independently to these locations, sometimes spending over two hours traveling to the central location, and without financial assistance from the educational system (Nawal, February 28, 2007). One teacher wrote: *the timing of training should be suitable for teachers' conditions; because the current training has become a burden on teachers* (Q1:36). The principal of Al Fajr School said that

> I think the time is not enough for training teachers on technology especially that the time of training is not suitable for teachers especially when it is conducted after school hours. (Hiba, December 11, 2005)

Furthermore, it appeared that the available ICT courses do not currently provide sufficient training to enable teachers to make use of ICT in their own teaching. Twenty-eight (24.3%) participant teachers in Phase1 who had received training asked for more training on ICT. In addition, The principal of Al Noor School said that *teacher training is not enough for teachers to be able to use ICT in their teaching, some teachers simply do not know how [to integrate ICT].* (Ali, December 15, 2005) Mentors also shared this idea about teachers' post-training competence: *some teachers are not prepared to use ICT, and when they do it was for presentation.* (Rajab, December 8, 2005) Basil also questioned teachers' effective use of ICT in light of their professional development courses saying that: *there is a clear plan [a strategic plan] for ICT integration but the current training does not prepare teachers to use technology in the classroom.* (Basil, December 13, 2005)

Furthermore, teachers expressed their frustration about both the physical environment of training and the quantity of machines provided. Some teachers asked for more space as the *rooms were very crowded* (Q1:116). In addition, teachers were asking for *more machines* in order to practice what they learn during their courses (Q1:121) as *the number of computers was not enough which causes to teacher's frustration* (Q1:116). In one of the teachers' words,

> There should be an opportunity for all trainees to be trained on each skill they are taught; that each trainee should practice by himself on machines so all peripherals [computers, data projectors, scanners…] should be available. (Q1:41)

b)   The role of teacher trainers

Teacher trainers were cited as an important ingredient in successful ICT professional development, especially in helping teachers to link training to classroom practice (Downes *et al.*, 2001; Fiszer, 2004; Wenger, 1998).

Teacher trainer issue emerged in both phases of the study, as clearly, the importance of teacher trainers had been underestimated. Teachers questioned both the ICT competence of trainers and their ability to train teachers on how to implement ICT skills in their teaching. In Phase1, one of the teachers complained that *teacher trainers are of the*

teachers and they are not selected on qualification basis. (Q1:88) In another teacher's

words: *trainers lack experience and ideal methods to pass knowledge in an*

understandable way. (Q1:90) Another teacher also wrote:

> Hopefully, trainers are selected as qualified and mindful of the
> purposes of the training course, because trainers themselves are
> unaware and they make us miss good opportunities to benefit from
> the course. (Q1:46)

The selection of teacher trainers frequently involved inter-personal interference, as there

were significant financial rewards in being selected. During one of my visits, a teacher

from Directorate7 was at the office and arguing with Omar. Once Omar left the office I

asked the teacher what the argument was about and the teacher replied naively that he

wanted to

> get benefit from training, whether it is supervision, training or
> whatever. People are making profits from what is going on [ICT
> training courses], so why shouldn't I?!

c) *Follow-up and ongoing support*

A major feature of successful ICT professional development is the quality of follow-up

which teachers receive after the training courses (Lewis, 1998). Anderson (1997) cited

"lack of good assistance" as one of the reasons that can cause teachers to abandon new

practices they learn during their training courses as soon as they return to the classroom.

Fiszer (2004) also warns that without follow-up teachers might abandon the new skills

they learn during their professional development courses because of "incompatibility"

with the real teaching/learning setting they face. In addition, Bradshaw (2002) concludes

that in order to maximize the return of investment in staff development, significant

resources need to be redirected to the follow-up activities. Similarly, according to

Huberman and Miles (1984), it is the assistance and support that teachers receive, once

change is underway, which decide the life or death of innovations in schools.

As outlined in Chapter 2, section 2.2, mentors are the main source of support and

assistance for Jordanian teachers classroom practice. Although principals are also

considered to be permanent mentors in schools, more than half (57%) of the principals in

this study indicated that they were *unable to assist teachers in integrating ICT in their*

teaching. Therefore, follow-up was exclusively the responsibility of subject mentors from the regional directorates of education. Nevertheless, it became clear that these mentors' role was limited due to first their workload, and second due to their lack of competence to guide teachers in the implementation of ICT.

Al Noor and Al Fajr schools were expected to receive intensive follow-up, due to their location within the vicinity of the Ministry and the directorate of education, and to their extensive participation in ICT integration. During Phase1 of this study, approximately 57% of Al Noor's teachers reported that they received follow-up for their ICT training, and approximately half of that percentage (28%) were from Al Fajr School. However, as indicated earlier, during Phase2 of the study it became clear that even participants in the two schools who reported receiving follow-up had misinterpreted this item in the questionnaire as referring to ordinary visits by stakeholders and officials. As the two schools were extensively involved with reform, they were often visited, but the purpose of visits was not follow-up for teachers in order to ensure their proper ICT implementation. While teachers who were undertaking Cader course were indeed visited by their trainers once a week, this course was available only for a meagre number of teachers.

One clear aspect of follow-up in the two schools was its lack of sustainability. As the two schools were among the first in the country to participate in reform during the pre-piloting and piloting stages of the new curricula, both received intensive follow-up when the reform was first launched during the school year 2003/2004. But the principal at Al Noor School referred to this instability of the follow-up as he noted that

> The digitisation started there was intense follow-up and mentors used to visit the school very often but this was only during the first year of the programme. The follow-up was only in the beginning of the programme and now it is superficial. (Ali, December 15, 2005)

Hiba also highlighted the sustainability issue saying that

> Teachers are asked to do activities during the courses and they forget all about it after that, for example, they are asked to make a

portfolio during Intel course only and nothing after that (Hiba, December 11, 2005).

Furthermore, Sami referred to significant differences between training courses in their provision of follow-up as he noted that

> Teachers received varied follow-up and this depended on the training course they are participate in, but in general, follow-up is weak because it is the responsibility of mentors and they do not do so. For example, teachers who received Intel training did not receive any follow-up after they returned to the school. Sami, December, 2005)

As the above interview was conducted in the teachers' room, there were other teachers at the other end of the room. Sami thus directed a question to one of them who had participated in an Intel course: *Teacher! After you finished Intel [course], did you receive any follow-up afterwards?* and the other teacher answered by: *No!* (Interview with Sami, December, 2005).

Yousif also indicated that he did not receive any form of follow-up. In addition, Jameel indicated that training *is important for teachers; however teachers need follow-up as well as good access to computers and to have skills to use them.* When I asked him whether he received follow-up after his training he said that he received visits from the e-math authors (private sector) and foreign visitors. However, these visits were not provided as follow-up and support for him; rather they were evaluation visits for the e-math. In respect to mentors' role, Jameel said that they *do not have an important role; they do not visit teachers in the classroom.* (Jameel, 15 November 2006)

Participants from all levels of the educational system pointed to the underperformance of follow-up. Participants commented on mentors' competence in providing assistance to teachers regarding ICT integration. Leila, from Al Fajr School, had undertaken the Intel course, during which she was required to develop a portfolio of her activities (e.g. presentations and work sheets). However, *after the end of the training course, it is up to teachers to use the skills they had learnt during these course or not.* Leila noted that her mentor

was cooperative and she (the mentor) was willing to learn from
what I do with technology and she usually asks me how I do this
and that. She is really good but she doesn't know how to help me.
(Leila, December 7, 2005)

Yousif also said, *(…) in my opinion, they [mentors] are neither prepared nor qualified to supervise teachers to use technologies.* (Yousif, December 30, 2005) Hassan, a mentor, reported that *a large number of mentors themselves are not convinced and are not trained on technology integration.* (Hassan, January 19, 2006)

Although I visited the two schools between 2005 and 2006, none of my visits coincided with any mentors' visits. The only visitors I met on these occasions were authors and developers of the e-contents who had come to evaluate the programme. I attended the English Interactive Online (EOI) class with Reem. She had attended only a workshop the week before in preparation for the EOI, which introduced her to how to use these contents in her teaching. However, even as a pre-pilot class, and though it was the first class to be implemented as part of that programme, there was no support for the teacher, as the only visitors to the class were the principal, another English teacher, and myself.

Furthermore, participants commented on the mentors' availability to provide follow-up for teachers. As will be discussed later, Chapter 7 (section 2.4) mentors' overload was evident and prevented them from providing assistance to teachers. Rajab, a mentor from Directorate2, said that he *used to visit the Discovery Schools very often, four to five times a week, sometimes daily during the piloting of the e-math last year [2004/2005].* (Rajab, December 8, 2005) However, after the first year of implementing the reform, the number of visits declined dramatically. Hassan, from Directorate1, also noted that *teachers usually do not receive follow-up and do not know how to integrate computers into their instruction.* (Hassan, January 19, 2006) However, he also indicated that he used to visit schools almost twice a week when the programme was launched; but that this later dropped to once or twice a year.

d)   School culture and teachers' interaction

The literature stresses the importance of supporting learning communities and
encouraging teachers to learn from each other and to break their traditional isolation
(Downes *et al.*, 2001; Fiszer, 2004; Wenger, 1998).

However, this factor was generally missing in the schools and most teachers were seen to
have only minimal interaction. Only enthusiastic teachers who had self-motivation
sought interaction with other knowledgeable teachers in the integration of ICT. As noted
earlier, Sami often received visits from fellow teachers who were keen to observe his
utilization of ICT, but he constitutes an exception.

For teachers who undertook the World Links course, there was an electronic discussion
board, to which they were requested to contribute. However, browsing through the
discussion board showed that most of the postings were made because of the course's
requirement. Some postings consisted only of the teacher's name and e-mail address. In
addition, the majority of participants in the discussion board posted only once and then
disappeared. However, there were a few active participants, who were mainly
coordinators or trainers in the programme. Furthermore, there were a small number of
postings where teachers participated by asking questions or sharing their own
experiences. For example, some teachers shared plans for lessons that integrate ICT in
teaching, which can be used by other teachers as models, while other teachers posted
links of useful websites (Visit: http://www.world-links.org/discuss/).

e)   Motives and incentives: the ranking and rewards system

Motives and incentives for teachers' involvement in ICT professional development
programmes are identified in the literature as a supporting factor for ICT professional
development (Downes *et al.*, 2001; Dusick, 1998; Shuldam, 2004).

As noted earlier, the Jordanian educational system made undertaking ICT courses a
prerequisite for teachers' ranking and rewards, and the vast majority of teachers (81%)
reported receiving incentives for their participation in ICT training courses. According to
one teacher: *money incentives have a big role in teacher's acceptance of learning*

[about] technologies. (Q1:26). Nevertheless, Sami criticised this link between the incentives and the ranking system, which according to him made teachers compete to participate in these courses and *forget what they learn during training course as soon as they receive the certificate.* This was also confirmed by Ali, as he noted that:

> Training courses do not qualify them [teachers] to use technology in their teaching; teachers may undertake training courses only for the certificate or the rewards and forget what they learn after that. (Ali, December 15, 2005)

Basil also referred to this point as he said that *until now, teachers undertake ICT professional development programmes only for the certificate, teachers' ranks, or money rewards.* (Basil, December 13, 2005)

6.3.1.5   *Teacher workload*

Hu *et al.* (2003) stated that teachers' workloads and the time constraints can severely hinder technology acceptance by teachers. Clearly, in order to achieve the goals of the educational system and to enable teachers to implement new initiatives, it is essential to reduce teachers' workload (Fullan, 1982; Fullan, 2003a; Grunberg *et al.*, 1992).

Ali, from Al Noor School, noted that *teachers are already overloaded; they could not cope with this pressure and the pressure from training.* In addition, Yousif pointed to the pressure on teachers to meet certain deadlines, as they were required to finish the textbook by the end of the year. Therefore, for Yousif, this was the main concern for him as a teacher, and he said that

> Including extra activities or spending more time on additional sources will distract me from the main goal for which is completing the textbook before the end of the school year. (Yousif, December 30, 2005)

Sami also mentioned that teachers being overloaded as one main obstacle facing ICT integration. In addition, mentors were aware of this aspect as Rajab stated that: *teachers are overloaded to learn, prepare, and practice what they learn.* (Rajab, December 8, 2005)

6.3.2 Focus on schools

This section will discuss factors associated with school contexts as they appeared to influence the overall integration of ICT. As discussed earlier in Chapter 3, section 3.3, school contexts can facilitate or hinder ICT adoption by school members. The following are the main issues associated with schools' integration of ICT as they emerged from the case studies: school leadership, teacher resistance, teacher competence, ICT professional development, and teacher overload.

6.3.2.1   School Leadership

A major factor for the success of ICT integration in schools is the leaderships' enthusiasm and cooperation with respect to implementing ICT at the school level (Earley *et al.*, 2004; Fink, 2005; Fullan, 1993; Fullan, 2003b; Richardson, 2005; Tyack *et al.*, 1994); it is school leaders who decide on organisational change and who determine the level of support offered to teachers in educational reform (Downes *et al.*, 2001).

At the school level, the overwhelming majority (91%) of teachers in Phase1 countrywide mentioned their leadership's support for ICT integration in their schools. In Al Noor School, Sami acknowledged that the principal was

> very cooperative. When a problem comes up with computers he does his best to solve it, and he make sure to arrange for maintenance when computers break down, he even sometimes pays from his own pocket to solve computer problems. (Sami, December 30, 2005).

Sami also recalled a situation which illustrated the principal's enthusiasm regarding ICT integration,

> (…) the principal asked one of the teachers, who had undertaken Intel course: 'teacher, did you undertake Intel course' and the teacher replied 'yes', then Ali asked 'have you ever accompanied your students to the computer lab?' and the teacher answered 'no', 'then why did you undertake it?!' Ali questioned him. (Sami, December 30, 2005)

Visiting this school nine months later revealed how changes in school leadership can affect ICT integration. As noted earlier, by the time of my second visit, there was a new

principal who had less enthusiasm and support for ICT integration. Accordingly, Al Noor had been without a computer lab coordinator for more than two months, and computers were dusty as they had not been used for a long time. Jameel compared the two principals' differing levels of follow-up of teachers' utilisation of ICT:

> The principal Ali [the former principal] used to follow-up our use of technology but the current principal leaves it to teachers without follow-up and the whole thing is left up to teachers. (Jameel, 15 November 2006)

On the other hand, all teachers in Al Fajr School who participated in Phase1 answered positively the item: *Is your school leadership supportive of teachers' ICT professional development?*, indicating that their principal was cooperative. Hiba, the principal of the school, expressed her satisfaction with Ministry's decision to integrate ICT across the system and she encouraged teachers to use computers. For instance, she did not accept any hand-written reports or papers from teachers and she used to urge them to do so with students; *now students do not submit hard copies, and they rely on electronic projects.* (Hiba, December 11, 2005)

In an unusual sign of school's autonomy, Hiba indicated that the school sometimes designed its own ICT courses. While the norm was to provide teachers with the ICDL course through the directorates of education, Hiba had arranged with the computer lab coordinator an extensive course in the school for two newly employed teachers who had not undertaken ICT training. Furthermore, she was using her interpersonal relationships to enforce her school's integration of ICT. For her, the regional directorate of education was "*very*" cooperative with her school due to her *good interpersonal relationships with officials in both the directorate and the Ministry,* which helped her school to receive what it *needs from the Ministry or the directorate.* (Hiba, December 11, 2005)

The awareness of the leadership's vital role in the success or failure of ICT implementation in schools was also acknowledged at other levels of the system. According to a mentor from the regional directorate:

> School principals sometimes hinder the integration when they do
> not seem to be enthusiastic, for example they may not follow-up
> the maintenance of computers when they break down. (Hassan,
> January 19, 2006)

In a clear illustration of the principal's strong influence over ICT integration at the school level, Zahi, a geography teacher, recalled his own experience. This teacher was undertaking an in-service course called the Diploma of ICT in Education, which included visits by trainers from the programme to the teacher in his classrooms. One of this teacher's lessons required using a data projector for presentation, which the school did not have as far as he knew because he had never seen it. However, he said,

> The principal astonished me when he said that the school had a
> data projector and it has been in the storage room for a long time.
> And he brought it from the storage room because of the visitors.
> (Zahi, November 28, 2005)

Another incident illustrating the vital role of principals in the integration of ICT occurred when I was at Maram's office in the Ministry of Education. Maram was the coordinator of Component 2 of ERfKE, which coordinates ICT integration within the project. During the interview she received a phone call. When the call ended she explained her anger during the call. She explained that when a donor agency attempted to deliver computers to one of the Discovery Schools as part of the ERfKE project, the principal refused to accept them because the principal did not want to have them under her responsibility.

6.3.2.2   ICT Infrastructure

Regarding ICT infrastructure in schools, two main issues appeared to have significant impact on ICT integration in schools:

    a)   Quantity
    b)   Quality

The two issues are discussed next.

a) Quantity

As noted earlier, Al Noor School had 1000 students with 60 computers, and 40 of these were connected to the Internet. Computers were located in two computer laboratories and a third one was being set up during the course of this study. Usually, 3 to 5 students

shared one computer due to the large number of students in each class. According to Sami, the school did not have sufficient number of computers for either teachers or students. Therefore, in spite of Sami's willingness and enthusiasm to use computer labs, he was not able to use them for more than once a week for a 45-minute class, and the rest of the week's teaching took place in a traditional form in classrooms.

However, Al Fajr School had relatively better access. This school had 798 students and access to 74 computers, with 39 of these connected to the Internet. Furthermore, the school had one computer connected to a data projector in two science labs, which enabled science teachers to use these computers without occupying the computer labs. The science labs also had spacious adjunct theatres which allowed for demonstrations of students' projects and provided extra access to computers outside computer labs. In addition, the library had two computers to be used by teachers and students when computer labs were occupied. Thus, the principal would note that *the good infrastructure in her school played a major role in the school's success of implementing technology.* (Hiba, November 29, 2005)

Furthermore, the Ministry of Education had agreements with local foundations and companies to facilitate teachers' purchase of computers by installments in order to encourage teachers to have their own computers. In addition, computers in Jordan had been made tax-free in order to encourage people to buy them at reasonable prices as part of the governments' plans for ICT infusion within the society at large. Nevertheless, despite a growing number of households which owned computers, this commodity was still considered as an expensive luxury for the majority of teachers.

b)   *Quality*

The quality of ICT infrastructure was evident as a key factor for ICT integration in schools. One of the teachers in Phase1 of this study wrote asking for: *…the provision of the needed peripherals, like good headphones as there are headphones and microphones for all computers but they are all not working, bad quality.* (Q1:27) And a major issue emerged regarding the quality of ICT was ease of Internet use, as all participants complained about unreliable and slow connections.

In Al Noor School, and during Visit (1) in 2005, I observed the slow rate of internet connection. In one of Sami's classes, students had an option to connect to the Internet and search for further information related to the lesson. However, because the connection was slow, they were unable to establish connection. The intranet, however, was faster (OBNS.1). Sami believed this slow connection is a major obstacle which prevents teachers and students from benefiting from the e-content, saying that slow Internet connection *does not allow teachers and students to benefit from resources available online.* Surprisingly, Sami also mentioned variation in connection,

> The Internet connection is very slow, but when there is a visitor in the school the connection becomes very fast, the link opens even before you click it. (Sami, December 30, 2005)

However, the reason behind this massive variation in Internet connection became clear during Visit (2). In November 2006, the head of Computers and Networks Department in Directorate2 acknowledged the continued slow Internet connection, despite some improvement. When I asked him about the clear variation of Internet connection, Ziad explained:

> Now, I have some schools which are more important than others. For example, it is important for me that Discovery Schools are always up and running. When a visitor visits a school, other schools are disconnected in order to provide fast connection for the visited school. (Ziad, November 2, 2006)

In a later interview Sami said with frustration: *provide me with only one hour of fast speed connection and I am able to do with it a lot more than a permanent but slow connection* (Sami, 27 October 2006). As presented in Chapter 5, teachers also stressed that in order to *benefit from websites especially regarding the newly developed curricula* (Q1:107), faster Internet connection and easer access to the e-contents are paramount factors. In addition, in another teacher's words,

> although the available training courses are well-prepared and good but the technology is inadequate to achieve what teachers were trained for. The network is very slow and could not cope with the connected schools leave alone if the number of connected computers increased, in fact, if schools would use the Internet as hoped for, the network would be totally down. (Q1:118)

In Al Fajr School, when Reem wanted to prepare for her English lesson, there was no Internet connection, and therefore she was unable to access the e-contents online. That day, she went to the class without preparation and relying only on general information she received during a training workshop. After the chaos of the lesson, she explained:

> we [herself and Najah, another English teacher at the same school] were lucky that we attended the workshop last week otherwise, I would be embarrassed in front of my students today, I tried to access the website on Thursday but there was no connection and yesterday I tried from home but it did not work. (Reem, November, 2006)

6.3.1.2   Computers' location in schools

Access to ICT in schools will remain limited until this technology is provided in regular classrooms. Neither school, Al Noor and Al Fajr, had computers in classrooms, apart from laptops brought into classrooms by teachers. Classrooms in Al Noor School were also crowded and it would be physically impossible to locate computers in classrooms considering students' large numbers (See Figure 6.3).

Figure 6.3:   A crowded classroom in Al Noor School

When the JEI was first launched, the school received nine (9) laptops. According to Mary, laptops were intended

> to be used anywhere in the school, especially in the classroom to access the digitised contents on the Eduwave, all discovery schools are provided by wireless connection so teachers can access the online contents from the classroom, computer laboratories, and teachers' room. (Mary, December 25, 2005)

However, during the course of this study, only two laptops were still functioning as the remainder were withdrawn or had become non-functional, one of them for several months. The principal explained that *because the laptops were received as grants from donors, they were not under warranty* (Ali, December 15, 2005), so the school had to fix them through the Directorate of Education. Rajab also indicated that *locating computers in laboratories restricts using them by teachers and students* (Rajab, December 8, 2005).

As noted earlier, Al Fajr School had a small number of computers located outside computer labs such as in science labs, the library, and the principal's office. Thus, these computers did provide additional chances for teachers and students to access ICT in the school. Even with only one computer in science labs, teachers were able to use each computer for presentations and working on students' projects.

Teachers' rooms are where teachers spend their spare time during the schooling day. However, in neither school, Al Noor and Al Fajr, was there any ICT located in the teachers' rooms. There were no changes in teachers' rooms: they were quite similar to the rooms that I had left eleven years earlier with tables, chairs and a few, mostly worn out, closets.

6.3.1.4   Computer labs' coordinators

As part of the digitisation process, each school with a computer lab had a coordinator who is responsible for the lab. Teachers need to organise their visits to the computer lab with the coordinator and he/she gives them access and prepares machines for their lessons. The coordinator had the responsibility of maintaining the functionality of computer labs in schools, and reporting machines or network failure, as well as ensuring

the functionality of machines before lessons start and being present during lessons. Generally, this person is not a technician who can fix technical problems when they arise. However, he/she is responsible for arranging maintenance and replacement when a technical problem occurs.

Considering that the main, or the only, access to ICT in schools is provided in computer labs, the coordinators can facilitate or hinder teachers' and students' access to these tools as teachers are required to pre-organise each time they want to use computers. Generally, coordinators conceived of ICT tools in schools as a *big responsibility* (Jameel) and they saw this responsibility as being theirs, which may have restricted them from cooperating with teachers and students out of cautiousness, and which in itself may have additionally contributed to computer anxiety among teachers and students (Harvey *et al.*, 1995; Rosen & Weil, 1994).

The coordinators' vital role was apparent in Al Noor School. During Visit (1) in 2005, it was clear that Nedal, the coordinator, was facilitating students' and teachers' utilisation of computer labs. During classes I attended at computer labs he was present to help teachers to overcome some basic technical problems, and his assistance enabled teachers to focus on their instruction rather than being distracted by technical issues. According to Sami,

> The computer labs' coordinator [Nedal] in our school is very helpful, however, in other schools, I have visited, I noticed that coordinators can become roadblocks when they do not cooperate with teachers and do not facilitate their access to computers. (Sami, December 30, 2005)

However, even with the most cooperative coordinators the demand for ICT assistance can become daunting. On one occasion the coordinator was overwhelmed because he was not able to cope with the demand from teachers in two different labs. At the lab where I was attending the lesson, the teacher spent fifteen (15) minutes of his class trying to overcome a connection problem, while the coordinator was busy with a teacher in another lab.

Moreover, visiting the same school in late 2006, nine months later, showed the effect of Nedal's departure. Jameel spoke about decline in computers' usage since Nedal had left:

> Computer subject teacher in the school is now the responsible from computer labs and it is a big responsibility. Days ago, because I have a copy of the lab's key, he told me 'Jameel, let's agree on the lab issue, you know it is a responsibility, so we either put the labs on your responsibility or you give me the key', and I do not blame him, because I know that it is a big responsibility. (Jameel, 15 November 2006)

As noted earlier, during this visit, Nedal's position was still vacant. Jameel illustrated how ICT condition in the school had changed since Nedal had left:

> Since the beginning of the schooling year we have been without a lab coordinator. Nedal left us to the private sector for a better job and since the beginning of the year [September, 2006] we have been asking for a lab coordinator. The lab now is not used. Last week I went down to the lab and found all computers covered with so much dust. (Jameel, 15 November 2006)

As previously illustrated, Al Fajr School had better infrastructure. However, the school had a *newly employed coordinator [who] does not know anything* (Hiba, November 29, 2005). I attended a class with Reem, an English teacher, at the computer lab. Students were intended to individually watch and listen to a clip on the course's website which explains how to *write a résumé* followed by questions to be answered individually. The teacher spent 15 minutes trying to make all students access the interactive website at Lab (2) but her attempts were in vain as there was no connection, and so, the class had to move to Lab (4). Then the principal joined the class and noticed the chaos, so she told the coordinator and the teacher "*you have to make sure of the connectivity and the headsets before the class started.*" (OBFR.1) However, the teacher confirmed later that although she had arranged for her class with the coordinator a day before and she arranged for providing a headset for each student, during the class there was only one student who was using her own headset. Therefore, students had to listen to the clip all together and the poor sound quality using computer speakers required the teacher to repeat it twice. I was sitting with students in the rear row with other students and I could not understand most of the words the first time it was run; it needed extra concentration to overcome the poor sound quality as only two small speakers were located at the front of the room.

The importance of computer laboratories' coordinators was echoed during interviews with mentors. Rajab indicated that computer labs' coordinators can become an obstacle in some cases when they do not facilitate students' and teachers' access to the lab.

6.3.2.5   *Overcrowded classrooms*

This aspect of schools' context was stressed by many participants during the course of this study and it has been mentioned in earlier studies. The World Bank's (2003b) report indicated that 20% of Jordanian students study in overcrowded schools. During the course of this study, it became clear that this issue is tightly linked to the overall integration of ICT. One teacher asked for *reducing the number of students in each classroom in order to follow-up students properly.* (Q1:56). In addition, another teacher wrote:

> … especially in large schools like this college, it is impossible to use machines because there are more than fifty students in each class which means that some computers will be used by more than three students which is impossible in practice. (Q1:27)

Al Noor School was struggling with large numbers of students in classrooms (45-55), and the principal indicated that such numbers were a major threat to the implementation of ICT. During my observation in one of Jameel's classes, I was sitting in the back of the room and students in the rear of the class and this issue was clear as the teacher found it hard to engage all students in the class. Students, especially in the rear of the class, were not following his instruction. In addition, he spent 10 minutes (out of 45) trying to solve some connection problems, as only a few students were able to access the e-contents due to connection problems. The lab's coordinator was not present at that time. Students' noise was increasing and the teacher was trying to contain their impatience. When he realised that time was running out, he decided to start the lesson with the few connected computers and he asked the rest of students to pay attention to the main data projector on the wall. This meant that most students would only listen to the teacher while a few students had access to the materials or could follow the teacher's instructions. At this point the coordinator arrived and managed to connect the rest of computers.

During the lesson, the teacher struggled to engage all students and to keep their noise down. Even with the teachers' attempt to pay attention to all students, he was overwhelmed by their numbers. Thus, some students were left in the shadow, and this was apparent when students were doing their activities. Students were answering multiple-choice questions and receiving feedback according to their answers on the screen. The activity required students to answer questions accordingly they received *"right"* or *"wrong"*. As I was observing from behind, students used to try different answers until they receive the *"right"* feedback. Frequently, Jameel asked students to pay attention and listen to his lecturing instead of working in their groups. In these cases, he was using the whiteboard to instruct the whole class (OBNE.1). During a follow-up interview, Jameel stressed that students' large numbers in classrooms is one of the main problems for him in using technologies.

Nine months later, in November 2006 when I visited the school, Jameel illustrated his continued struggle with the overcrowded classrooms:

> In the beginning of the schooling year 2006/2007, students' number in each class reached 54. In the classroom I was moving right next to the door because of the crowd; and that was the only space where I can move in the room. (Jameel, 15 November 2006).

Notwithstanding, there were significant differences amongst teachers in the ways they dealt with student numbers in class. One of Sami's classes had 50 students with access to 20 computers. The class started sharply on time. Sami was admirably effective in dealing with the large number of students in the room. He divided students into small groups of 2-3 students, and then assigned a *head* for each group who spoke and asked on behalf of the group and was responsible for keeping the noise down in his group. Students were all engaged in the lesson and they were participating in both their small groups and in the discussion of the whole class. The teacher was also paying attention to the noise level, and in two occasions he asked students to keep the noise level down. In addition the coordinator of the computer lab was present from the beginning, which made the lesson run smoothly and gave Sami enough chance to concentrate on his teaching without being distracted by the technical problems of ICT.

Furthermore, Sami's instructional strategy focused on facilitating students' learning rather than lecturing them. He walked between the groups and gave advice to individual students and groups. When a student asked a question, he used to give the answer to the student individually, or to the whole class if the answer would help other students to complete their activities.

Nevertheless, in Sami's class, there was still inequality between students in their first-hand use of computers, especially in large groups. While some students were able to experience by computers themselves, others were only observing other students who were performing the activities on the computer, and did not have a chance even to touch the mouse. This resulted in some students appearing isolated within their groups, and not participating in the discussion. The teacher sometimes noticed this and tried to get these students involved by asking them to participate (OBNS.1). In a follow-up interview with Sami, he said that he *did not think students' large number is a problem when the teacher is able to deal with this issue effectively.* (Sami, December 30, 2005)

Unlike Al Noor School, participants from Al Fajr School did not mention student numbers in classrooms as the school had reasonable student numbers of 25-33 per class. Students had enough space in classrooms and the teacher was able to easily move between students (Figure 6.4).

Figure 6.4:   A lesson in Al Fajr School

Mentors also mentioned students' large numbers in classrooms as a major challenge to the integration of ICT in schools. Hassan indicated that

> Students' number in classrooms can be a major challenge, in some cases there are 64 students in one classroom, even teachers who are enthusiastic and who want to use computers get frustrated because of students' number. (Hassan, January 19, 2006)

6.3.1.5   *ICT access outside schools*

Teachers' and students' personal use of ICT can facilitate their overall adoption of ICT. A clear sign of the lack of teachers' personal use of ICT in their daily lives was evident when I asked Leila for her email address in order to send her a copy of the interview for review, and she responded that she had not checked it for two months; and that she was not sure whether her email account was still active or not. Surprisingly, Samar from the same schools appeared to be one of the most enthusiastic teachers in using ICT, similarly, informed me that she did not have an email account.

In respect to students' access to ICT outside schools, Rajab indicated that this is another problem facing ICT integration in general: *students do not have the opportunity to practice on computers at home*. (Rajab, December 8, 2005) However, due to the wealthy socio-economic background of students in Al Noor and Al Fair schools, it was clear that most did have a good level of access to ICT at home. For instance, in one class at Al Fajr School, I was observing a class and at the end of the class we had an open discussion when I asked students a direct question "who's got a computer at home?!" and all students raised their hands. (OBFL.1) This was also apparent in students' computer skills, when some of them were able to set up the devices and connect the computers in preparation for the presentations. In another instance, I was having a chat with the principal in her office and a student was called to do something on the computer which teachers were unable to perform. The principal called her "the expert" because she helps the school in overcoming some computer problems. Furthermore, the principal also mentioned that *students are very cooperative, when we want something they just do it at home*. (Hiba, December 7, 2005)

Likewise, students in Al Noor School were able to afford access to ICT, whether at home or Internet cafes after school hours. Sami mentioned that parents were

> very cooperative and their financial status enabled them to afford getting access to computers and Internet at home for their children. However, in other schools, parents could not keep up with that and they complain that they could not afford sending their children to Internet cafes when teachers ask them to do research online because this exhausts them financially. (Sami, December 30, 2005)

6.3 Summary

Chapter 6 has presented findings from the investigation conducted in Phase2 of the study. The investigation relied on two case studies which comprised two schools that appeared to be among those which that have optimal conditions for ICT integration within the Jordanian educational system. Two sets of issues were identified: issues associated with teachers and their adoption of ICT, and issues associated with the school context.

It became evident that the interaction of teachers' and school's issues can decide the overall integration of ICT. Teachers' preparedness and willingness to adopt ICT was greatly varied among teachers. While some teachers demonstrated both willingness and competence during their adoption of ICT, others showed less preparedness or less positive attitudes. Furthermore, the two schools investigated were substantially different in their capacity to integrate ICT. While Al Fajr was better in terms of quality and quantity of ICT as well as the administration's support for ICT integration, Al Noor School was clearly limited in its capacity to adopt ICT due to its ICT infrastructure as well as the administration's stability and its attitude towards ICT in the school.

In the next chapter, Chapter 7, I will pursue issues which emerged from my investigation at the system level beyond schools walls: at directorate and Ministry levels. The issues involving these two levels in respect to ICT integration across the educational system will complete my account about the Jordanian educational system's integration of ICT.

Chapter 7

Beyond Schools: Regional Directorates and

Ministry of Education

In Chapter 6, I presented findings from the investigation at schools' levels. These illustrated issues associated with teachers' and schools' adoption and integration of ICT. As indicated earlier, this investigation at the school level pointed to the need for further investigation beyond school walls to include other levels of the educational system that are believed to have direct influence over ICT integration. Therefore, the investigation expanded to include the regional directorates of education and the Ministry of Education. Investigation at these levels included interviews with officials according to their roles in ICT integration across the educational system, that is: at stages of decision-making, implementation and follow-up.

This chapter presents two categories of findings:

- Issues associated with the decision to undertake ICT integration; and
- Issues associated with ICT implementation and follow-up.

7.1 Issues associated with the decision to undertake ICT integration

This section presents issues associated with the Jordanian educational system's adoption and integration of ICT. The discussion includes the following issues: the decision-making process, top-down educational reform, and public-private partnership.

7.1.1 ICT adoption: the decision

The literature on ICT integration has stressed the importance of clear and educationally-driven goals for educational reform. In the first place, change itself should be justified (Fullan *et al.*, 1996). The literature warns of ICT integration driven by faddism, that is

by following what is popular or promoted in the market as a remedy for educational problems (Anderson, 1997; Bradshaw, 2002; Lewis, 1998).

During the course of this study two drivers emerged for the Jordanian educational system's move to adopt ICT: firstly, there has been strong commitment and enthusiasm from the leadership of Jordan for integrating ICT into society as a whole, and secondly, there have been radical changes in the market, and growing demand for ICT literate teachers who can effectively prepare school graduates for globalised world.

According to McConnell's (2002) E-readiness report, one of the distinctive advantages for ICT integration in Jordan is *His Majesty's clear vision and commitment to ICT development* (p.4). Maram, a senior official from the Ministry of Education, also stressed that this vision was evident since

> His Majesty King Abdullah II had announced, since his ascendance to the crown [in 1999], that Jordan will be 'the IT hub in the region.' *(Maram, November 6, 2005)*

Following this lead from His Majesty, Jordan has come to view ICT as a priority for the country's development in general and educational reform in particular. Thus, the turning of the 21st century marked a major shift towards embracing ICT. This trend was further underlined in 2002 when

> the 'Vision Forum for the Future of Education in Jordan' was held and His Majesty the King attended it. There was a remarkable role for this forum and the patronage of His majesty in clarifying Jordan's vision and its plans for the future. *(Maram, November 6, 2005)*

However, this enthusiasm to adopt ICT was overshadowed by the realisation of the high cost of such innovation for a country with few resources. The limited resources available for development and reform has often made the educational system seek assistance and financing from international aid agencies and other countries. This was a major driver behind holding the Vision Forum in 2002, which introduced and promoted the ERfKE project and the JEI to international and local partners. This forum generated remarkable international support for the initiatives, and subsequently, the Ministry of Education

received a team from the World Bank to discuss how it can help in implementing the recommendations made during the Forum. (Maram, November 6, 2005)

Jordan's fragile economy and the support it receives from Jordanians working abroad have substantial impact on reform projects. The Jordanian educational system's plans for reform usually consider the regional market which contributes to the Jordanian economy in two main ways:

- Jordan's local market is small and incapable of accommodating large numbers of graduates and job seekers. Thus, a large proportion of Jordan's workforce working abroad have eased some pressure off local markets and reduced unemployment.
- Remittances from Jordanian workforces working in neighbouring countries, especially in the Gulf states, have contributed to the Jordanian economy

Pervasive and dramatic changes in regional and global markets, as well as the increasing competitiveness in the marketplace have pressed the educational system to undertake reform. There is a growing demand for employees who are ICT literate, and therefore, Jordan had to respond quickly to these changes, otherwise, *it [Jordan] would have been overtaken by other countries in the region* (Maram, November 6, 2005). According to Omar, the Ministry of Education

> does not work for the Jordanian market only, there has been a high demand on our teachers from neighbouring countries and we try to keep up with that. *(Omar, January 2, 2006)*

Jordanian teachers have long worked in neighbouring countries, and in recent years *there has been a high demand in the region on teachers who are computer literate* (Omar, January 2, 2006), thus lending further support to ICT integration in education.

Furthermore, the educational system was aware of changes evolving within both local and global markets and the *acceleration towards the knowledge society, which required changes in educational outcomes.* (Maram, November 6, 2005) Therefore, in order to prepare today's students for the future, the educational system had to *re-think about the*

skills it is trying to create within students and to focus on new skills; such as teamwork, communication skills, ethics, honesty, computer skills, critical thinking, problem-solving and multi-languages. (Maram, November 6, 2005) In addition, there have been increasing developments in ICT itself, which facilitated the educational system's adoption. One major development has been the reduction of the language barrier, as formerly there was little presence of the Arabic language in ICT for educational purposes. Therefore, as the language issue has been improving, the Jordanian educational system has been able to accelerate ICT adoption, especially *the integration of Arabic language to multimedia.* (Maram, November 6, 2005) This point was also confirmed by Omar, who reported that ICDL *started the Arabic version of their [training] courses so we adopted it.* (Omar, January 2, 2006)

7.1.2 Top-down Reform

As noted earlier in Chapter 2 (section 2.2) the Jordanian educational system is a centralised system that relies on the top-down model in disseminating educational reform and initiatives. As such, this model of management and implementation of reform differs fundamentally from a participatory, outcome-based and student-centred model (World Bank, 2003b) which shares the responsibilities of reform with its implementers.

ERfKE was an example of a top-down model, whereby teachers remained at the receiving end of reform. According to Leila, only two teachers participated in general meetings in preparation for ERfKE. She said - in a tone of pride -:

> Only two teachers attended the preparation meeting for ERfKE, myself and another male teacher. Also, I attended the discussion meetings of the Jordanian Education Initiative and I was speaking as the representative of teachers. I was speaking as the representative of teachers *(Leila, December 7, 2005).*

A top-down strategy in implementing educational reform was also apparent in assigning and distributing ICT professional development courses. As noted earlier, the four ICT training courses - ICDL, Intel, Word Links and iEARN were all international courses which were adopted by the Ministry of Education and then distributed across the system through a cascade model as follows:

A core team of trainers is formed within the Ministry, and this
team trains core teams from the regional directorates of education.
The regional core teams are mainly formed of mentors who will
train teachers and other mentors in their directorates. *(Omar,
January 2, 2006)*

7.1.3 Public-private partnership

As noted earlier, the ambitious goals aiming to transform the Jordanian educational

system for the knowledge-based economy were overshadowed by the high costs of ICT

integration. Therefore, the educational system sought assistance and support from aid

organisations and other countries.

As indicated in Chapter 2, the involvement of international aid organisations in national

ICT initiatives have recently increased substantially. Both the ERfKE and the JEI

projects show a substantial shift toward direct involvement of the international private

sector. The involvement of such international partners aims to assist developing countries

in order to bridge the digital divide between them and other developed countries.

Public/private partnership was stressed by the UN Millennium Development Goals of

2000, which cited building a global partnership in order to tackle development problems

in developing countries and to make available the benefits of ICT to these countries

(United Nations, 2005). However, the limited capacity of the Jordanian local private

sector and the immense task of undertaking large-scale reform made it inevitable for the

education system to seek assistance from the international private sector. Figure 7.1

illustrates the massive involvement of overseas sectors in the JEI. 50% of the total

spending on the initiative was secured through global private sector.

100% = US$22m

NGOs, Universities and Foundations — 1

Local Private Sector 6

Jordanian Government 11

International Donors 32

Global Private Sector 50
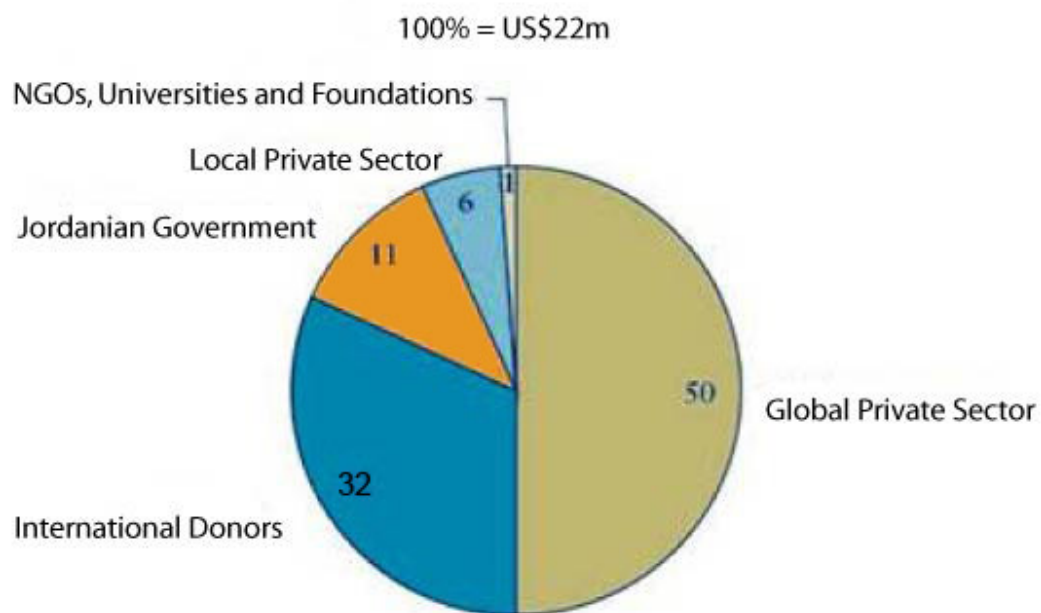
Figure 7.1:   Relative contribution of private and public sectors in the JEI. (Source: McKinsey & Company, 2005, p.26)

Although the involvement of international private sector and aid organisations provided critically needed assistance and funding in order to be able to undertake large-scale educational reform, this involvement had an impact on the overall integration of ICT within the educational system of Jordan. Moreover, the involvement of foreign partners has also shifted over time as they have become more directly involved in national initiatives. According to Ruba, agreement between the World Bank and the government of Jordan required the Ministry of Education to establish a Development and Coordination Unit (DCU) in order to coordinate and oversee the implementation of ERfKE. She said:

> It is not like before, now there is no money given directly to the government [of Jordan]; instead, the World Bank is now involved with the project by itself through the DCU. *(Ruba, December 5, 2005)*

The Unit *acts on behalf of the Ministry with loaners and donors* and sends progress reports to the Bank half yearly (Justin, December 13, 2005). However, when the Unit was coordinating project efforts during the implementation of ERfKE, it was

understaffed (Justin and Ruba) and its role confined to working within the Ministry of Education and coordinating reports and correspondence between the Ministry and the World Bank. According to Justin: *the Unit uses 60% of the Internet traffic* because the Unit was the only section of the Ministry that relies heavily on electronic communication. When the unit used to communicate with other sections within the Ministry they had to send another hard copy because the adoption of electronic communication was still slow in the other sections (Justin). Moreover, the implementation of ERfKE was additionally overseen by individual departments of the Ministry of Education, and the DCU received reports from each department regarding the progress of implementation.

ICT training courses illustrate the pervasive involvement of international partners in ERfKE. As indicated earlier, the major four ICT training courses adopted by the Ministry of Education, ICDL, Intel, World Links and iEARN are all international courses. Furthermore, e-curricula were also developed by local companies in cooperation with foreign corporations. For instance, the E-math content was developed by Rubicon, a local company in partnership with the Cisco Learning Institute, California, and sponsored by Cisco Systems under the guidance of the Jordan Ministry of Education. On the one hand, the overseas partner, Cisco Systems, was motivated by an opportunity to develop innovative and globally usable e-content trialed in real school contexts (McKinsey & Company, 2005). On the other hand, Rubicon, the local partner, was motivated by resources transferred from global partners, as well as the potential to export e-Curricula to regional or global education systems.

Jordan is recognised as a moderate country in the region, which enables it to act as a bridge between the West and other more conservative countries in the region. Therefore, Jordan has the potential to be a passageway for foreign companies to other countries in the region which Jordan shares fundamental features with, especially language, religion, and culture. Materials developed in Jordan can be adopted and implemented by other educational systems in the region which have an approximate total population of 325 million.

During the second and third years of implementing ICT training courses in Jordan, some of these international courses were indeed expanding to other countries in the region. According to Sahar, the World Links course expanded rapidly after its success in Jordan,

> We started in Jordan and we are improving and extending our mission; the number of trained teachers by the World Links is increasing and we have expanded our course to other countries after Jordan [including] Syria, Yemen, and recently Palestine. *(Sahar, November, 2005)*

In addition, E-math contents were being exported to other countries. Maram indicated that *an agreement will be signed for unified curricula between the Ministry of Education and Saudi Arabia in Mathematic.* (Maram, November 6, 2005)

Two main issues arose during the implementation of the ERfKE, as a result of the involvement of the private sector, which caused unexpected delays during the implementation stage. Firstly, it was reported that there was a problem regarding private companies' compliance with deadlines and agreements for developing e-contents, which *caused delay and other problems in the process of implantation* (Kawsar, December 25, 2005). According to Maram,

> When the Ministry of Education reaches an agreement with a given private company, and this company does not comply with the deadlines and conditions agreed upon, it results in delay and chaos during the implementation. *(Maram, November 6, 2005)*

Secondly, disputes emerged, after the Ministry made the e-content available for teachers and students in schools, regarding the copyright of the e-contents and which party was responsible for upgrading and updating these contents in the future. According to Kawsar,

> The copyright issue has not settled yet between the Ministry of Education and the private companies […], which has caused much delay in the implementation of plans. *(Kawsar, December 25, 2005)*

In addition, Omar indicated that

> The stage after the digitisation is unclear; the copyright and development of the new materials are still unsettled issues between the Ministry and the private sector. *(Omar, January 2, 2006)*

Clearly, the Ministry of Education was conscious of the substantial involvement of external partners. In clear signs of this consciousness, the project title and abbreviation, ERfKE which stands for '*Education Reform for the Knowledge Economy*', are in English rather than Arabic. In addition, the JEI website has only an English website without an Arabic version (www.jei.org.jo, accessed on October 10, 2007). This can be understood in light of the fact that funds and assistance for both ERfKE and the JEI were mainly from developed and English speaking countries.

7.2 Issues associated with ICT implementation and follow-up

This section presents issues emerging during the implementation of ICT across the Jordanian educational system, including: impact of unexpected factors on educational reform, coordination and standards, fast track reform and sustainability, mentors' overload, maintenance and technical support, and interpersonal relationships VS qualifications and competence.

7.2.1 The impact of unexpected factors on educational reform

Contextual factors, as well as unpredictable events within the region have often pressured and disrupted reform and development projects within Jordan. As illustrated in Chapter 2 (section 1.1) Jordan is small country in the heart of the turbulent Middle East, which has often had severe consequences. In addition, the country also relies to a great extent on international aid, especially in undertaking large-scale development and reform projects, due to the scarcity of resources available for development within the country.

This research study was conducted approximately two years after the invasion of Iraq in 2003 which had resulted in a mass influx of refugees into Jordan. School visits made between October 2005 and November 2006 highlighted the pressure on the educational system as a result of this war. Basil restated the continuing problems caused by the acceptance of refugees from neighbouring countries:

> In the beginning of this year we had to deal with 60 thousand Iraqi
> students who swamped schools and caused too much disruption

and havoc, because this happened after we had prepared ourselves for this [school] year. Their arrival caused shortage in textbooks as we had printed a certain number and did not expect this. This issue was even discussed in the parliament [due to its large scale]. *(Basil, December 13, 2005)*

This issue was particularly significant in already crowded Amman, where most of the refugees settled. For example, at the beginning of the school year 2007/2008, the majority of 50,000 Iraqi school-age refugees were expected to enter schools in Amman (AlKhawaja, 2007).

Furthermore, there were other forms of migration which affected the school system, including students' migration from private to public (governmental) schools and teachers' movement to work in other countries. According to Maram:

Private schools are no longer superior to governmental schools, quite the opposite; there is migration in thousands [of students] from private schools to governmental schools due to good performance of the governmental education and the availability of technologies [in governmental schools].

While welcoming this development, Maram acknowledged that it could cause additional disruption as the system tries to respond to the sudden arrival of such students. She believed that

This can cause a problem, that is accommodating these students especially that planning did not take into account these extra numbers of students. *(Maram, November 6, 2005)*

Most recently, in the beginning of the school year 2007/2008, an estimated number of 6,000 students moved from private education to public education, principally in the Amman region (AlKhawaja, 2007).

As noted above, another kind of migration was reported as teachers left in large numbers to work in neighbouring countries. On one hand, this has been the case for several decades as Jordanian teachers have working for other educational systems in the region. On the other hand, as Jordanian teachers were receiving several ICT training courses, the demand for them in educational systems from the Gulf states was becoming high as these systems

> started employing large numbers of our teachers, bearing in mind that this may create problems for the Ministry as it needs to fill in these vacant positions quickly by finding substitutes and train them again. *(Maram, November 6, 2005)*

Economic pressure arises here again as the Ministry has to strike a balance between educational and economic needs. As noted earlier, economic motives were a major driving force behind reform, and the Ministry cannot prevent teachers from seeking better salaries as the national economy is in need of their remittances when they work abroad. At the same time, the educational system has a responsibility to employ new teachers in order to fulfil the positions vacated as a result of teachers working abroad.

My visit to Jordan in November 2006 also enabled confirmation of some aspects of students' migration. Jameel, from Al Noor School in Amman, also pointed to students' migration from private to public schools and he emphasised the disruption that followed:

> In the beginning of the schooling year 2006/2007, student numbers rose from 936 to 1200 because of the good reputation of the school, however, this caused too much pressure on the school as we had to accept them [the new students]. Over 200 of those students were from the private education. Student numbers in each class reached 54. However, because students in the private education are not used to this crowd in the classroom, migration happened in the other direction to the private education and now students' number in classrooms is back to around 45. *(Jameel, 15 November 2006).*

Furthermore, there was another internal migration among teachers, especially males. Visit (2) to Jordan, in November 2006, revealed that four of the participants in this study from Al Noor School/boys, including the principal, had left to other positions. Sami, Yousif and Nedal had left public education to work for the private sector for better conditions and pay. Sami rationalised his decision saying: *this is a better job and I am always looking forward to improve my situation and, as you know, the situation in public education is bad.* (Sami, 27 October 2006) However, Al Fajr School/girls was more stable, as Leila was the only participant who was on leave to work for the Administration of Curricula and School Textbooks.

7.2.2 Coordination and standards

Educational systems should define their own national standards for ICT integration and strategies in order to meet clear, well-defined educational goals (Billeh, 2002). While adopting internationally developed ICT professional development courses can be justified in many ways, the local educational authority should develop national standards for local integration (European SchoolNet, 2005).

As indicated earlier, ICT integration within the Jordanian educational system was marked by the substantial participation of international partners. Nevertheless, although *the Ministry of Education has a strategic and plan for integrating technology* (Basil, December 13, 2005), there were in fact no detailed standards for ICT professional development courses, nor was there sufficient coordination between these courses, with the latter sometimes even leading to competition for resources.

When Omar was asked about standards for ICT training courses he indicated that *there are no standards for training; it's up to the courses themselves to have their own standards* (Omar, January 2, 2006). This was also confirmed by Maram saying:

> Unfortunately, there are no such standards; even that I have raised this issue in several occasions and conferences saying that we have to develop such standards but there is none yet. *(Maram, November 6, 2005)*

Omar further highlighted the absence of standards for the overall integration of ICT as he explained the way in which ICDL was adopted:

> […] for example, we found that the ICDL is well-known in the global market and they [its developers] started the Arabic version of their courses so we adopted it. *(Omar, January 2, 2006)*

Omar further explained that

> the Ministry of Education opened its doors for international courses [like] highway, all courses are welcomed as long as they can secure fund and get the approval from us [the Ministry] as we ensure their sensitivity to the local culture and values. *(Omar, January 2, 2006)*

Moreover, it was clear that there existed poor coordination between ICT training courses. Ali, the principal of Al Noor School, stated that teachers were under additional pressure because

> the development has happened in a very short time which sometimes created problems within the system; many training courses operating at the same time. *(Ali, December 15, 2005)*

Sami also indicated that in spite of the remarkable benefits of ICT training courses, the lack of coordination between them was an obstacle. He indicated that there are *many courses available for teachers and they are operating at the same time and this causes sort of competition between them.* (Sami, December 30, 2005) This claim was also confirmed by Sahar, a coordinator of one of the courses, as she recalled saying to *[…] officials from the Ministry of Education that coordination between the operating courses is needed because it does not work like this [without coordination]. (Sahar, November, 2005)*

7.2.3 Fast track reform and sustainability

ICT will never have a fundamental impact on teaching and learning unless it is woven into the daily professional lives of teachers (Guskey, 1997; Shuldam, 2004). Fullan (1982) identified four stages of ICT integration: initiation, implementation, continuation, and outcomes. He insisted that neither initiation nor implementation could achieve fundamental outcomes without reaching the continuation stage, for it is at that stage only initiatives become a part of daily practices.

Participants in this study indicated that the diffusion of ICT across the Jordanian educational system had moved at a fast pace. Ali indicated that *the development has happened in a very short time and this has created some problems within the system. (Ali, December 15, 2005)* Leila also acknowledged this aspect of ICT integration saying:

> We are going fast in the path of digitisation; I think this pace of integration can be disadvantageous. Training should be combined with practice and this needs access [to ICT] and so on. *(Leila, December 7, 2005)*

Nevertheless, mentors, teachers, and principals who participated in this study acknowledged that the reform started remarkably strongly in 2003. As mentioned earlier, during the first year of implementing the E-math programme, mentors used to visit schools schools *very often* (Ali, December 15, 2005). They used to visit schools *four to five times a week* (Rajab, December 8, 2005) or *daily* (Hassan, January 19, 2006). However, this level of follow-up took place only in *the Discovery Schools and during the first year of implementing the E-math* (Rajab, December 8, 2005). Surprisingly, mentors' visits to schools declined drastically after the first year of implementation. During the second and the third year, mentors' visits to schools, even to the Discovery Schools, occurred *once or twice a year.* (Hassan, January 19, 2006)

In 2003, the Ministry of Education developed digital materials for physics subject in the form of compact discs (CDs) called *"I Love Physics."* The Ministry dedicated *too much time, money, and effort to develop [the CD] as complementary for physics in grade ten.* (Salem, December 6, 2005) However, teachers received only *two-hour seminar* which introduced them to the these materials (Sami, e-mail). Moreover, the CD was not used afterward and *ended up in schools' closets [and]* that *90% of teachers do not know that it [the CD] even exists* (Sami, December 30, 2005). Salem, from the Digitization Unit which participated in developing the CD, said in a tone of frustration: *the CD is not used now.* And he tried to put the failure of adopting the CD into a context:

> I think this is one of the main things that challenge our efforts for reform in general. We start full of energy and we improve, then what we develop does not get implemented and not used by teachers. *(Salem, December 6, 2005)*

The Ministry of Education was struggling to meet predefined deadlines and demands. However, ICT integration did not proceed at the same pace in all tracks of the reform project (e.g. infrastructure, e-contents, curricula). While the e-Curricula track in the JEI, especially the E-math, proceeded at a fast pace, other tracks were lagging behind. According to Basil,

> when these materials [the e-content and the new curricula] became available, the Ministry realised that teachers were not prepared to use them and the infrastructure was not sufficient. *(Basil, December 13, 2005)*

The Electronic Training Unit was caught off guard, as it was already overwhelmed by the massive task of providing teachers with basic ICT training through the ICDL course. Thereafter, when e-content became available online, the system realised that even though the vast majority of teachers had undertaken the ICDL course, they did not know how to use ICT in their teaching (Ali, December 15, 2005 and Basil, December 13, 2005).

Furthermore, the educational system was struggling to meet the deadlines set out for ICT integration. The launch of ERfKE was delayed by one year, which, according to Justin, was due to the current capacity of the Ministry of Education (Justin, December 13, 2005). In addition, infrastructure improvement did not meet expectations. Samir, a mentor from Directorate1, recalled an incident when a directorate of education sent a statistical report to the Ministry about the computers in schools,

> [A senior official from the Ministry] got angry and rebuffed the report saying 'what would be said about us when we represent this report with these small numbers of computer?' and he asked for changing the numbers to be more representable. *(Samir, January 19, 2006)*

7.2.4 Mentors' overload

As explained in Chapter 2, section 2.2, mentoring departments in the regional directorate of education are responsible from providing follow-up for both teachers and schools. Mentors provide assistance for and compile reports about teachers' and schools' performance. Evaluation reports are to be sent about the performance of each individual teacher and each school at the end of each school year. Therefore, mentors are expected to visit teachers in their classrooms in order to support and evaluate their performance. However, during the course of this study, it became evident that the mentors' role had been substantially marginalised.

It also appeared that mentors were extremely overloaded. The principal of Al Noor School indicated that mentors were often removed from their mentoring role in order to reinforce other fields even though they *are supposed to provide follow-up, but they are busy with training and digitisation […] they do not have time for follow-up.* (Ali, December 15, 2005) Overall, the role of directorates was reduced to superficial one. According to Sami,

> The directorate has superficial role in integrating technology […]
> it stresses only on uploading students' names and results [online]
> to the Eduwave. *(Sami, December 30, 2005)*

Mentors indicated that this diminished role was due to their excessive workload. Rajab, a mentor from Directorate2, said that *each mentor is responsible for 120-130 schools*, each of which is expected to be visited, supported, and evaluated. However, this appears to be impossible in light of the large number of schools assigned to each mentor and considering that the school year has 193 working days over two semesters (Ministry of Education, 2005b). Therefore, as noted earlier, teachers might receive one or two visits during the school year, which can be used only for evaluation rather than support and follow-up. As noted earlier, during the first year of implementing the E-math curricula in the Discovery Schools, some mentors reported visiting schools daily (Hassan and Rajab). But when I asked Hassan, a mentor from Directorate1, about the frequency of his visits to schools in the second year of the reform, he laughed and replied: *visits are back to the norm […] it would be great if I can visit a teacher once or twice a year.* (Hassan, January 19, 2006) Furthermore, as the Ministry of Education relied on a cascade model of disseminating ICT training courses, mentors were the local agents for the Ministry in the regions. Therefore, this also increased mentors' distraction from providing support and follow-up for teachers.

When I initially sought approval to interview mentors from directorates of education, the shortage of mentors became clear. There were few mentors available, especially in subjects that were in the process of being digitised (e.g. mathematics and science). When I asked the head of the Department of Mentoring and Professional Development in Directorate2 about mentors from her department who might be available for interviews, she replied:

> I do not have any mathematics or physics mentors, they are all
> busy working for the Department of Curricula and Textbooks as
> part of the digitisation. *(Ola, November 21, 2005)*

7.2.5 Maintenance and Technical Support

On-going maintenance, replacement and update and upgrade are main aspects of successful ICT integration. According to Hepp *et al.* (2004), "unreliable technology is the best innovation killer" (p.35). However, educational systems' capacity and ability to provide such ongoing effort and recurrent expenses are greatly varied and this, according to Servon (2002), is becoming another aspect of the digital divide. That is, some schools might have computer labs and access to the Internet but there is not enough budget for maintenance or to buy hardware and software.

Maintenance and technological support were frequently mentioned as problematic by teachers, principals and mentors. As indicated above, Al Noor School received nine laptops in 2004 in order to enable teachers to access e-content from anywhere in the school using wireless connection provided through the JEI. However, during school visits for this study –between 5005 and 2006- seven laptops had been withdrawn due to faults. Yousif was one of the teachers who received a laptop, however, during the course of this study his laptop was non-functional. He expressed his frustration when he described his journey to get the laptop fixed:

> Maintenance is frustrating. I have a laptop which has been out of order for more than one month and half, I kept trying to fix it through the directorate of education and when I insisted on them to get it fixed they told me 'fix it on your own'. *(Yousif, December 30, 2005)*

Jameel from the same school also had a similar experience:

> It has been almost a year since I handed the laptop to them [the directorate]. I still have the recept which says that the laptop was not broken [due to carelessness], the monitor was faulty [he shows me the recept]. Even so, the principal told me that he heard in the Ministry that they want to fine me even, as you know, that they received these laptops as donations and the technician who wrote the report did not say it was a result of carelessness or negligence… it is just a machine! *(Jameel, 5 November 2006)*

The principal of the school highlighted this problem further saying that

> Laptops in the school need maintenance and because they were donations from aid agencies they are not under warranty and we

have to get them fixed through the directorate of education and this process takes too much time. *(Ali, December 15, 2005)*

The maintenance issue was also acknowledged beyond schools. Rajab, a mentor from Directorate2 stressed this aspect of ICT integration saying that *despite computers are in satisfying numbers in some schools, the process of maintenance is slow*. (Rajab, December 8, 2005) Ziad, the head of Computers and Networks Department puts this issue into perspective:

> All computers have two to three years warranty and this is part of their prices, however, we received lots of laptops as grants from USAID so they were not entitled for warranty and I know that the IBM laptops that we received had lots of problems […] They were very slow and the batteries run quickly dead [...] they were Pentium III and I think it is used [sic]. At the same time, you could not imagine someone gives you a gift and it breaks down then you ask him to repair it. *(Ziad, November 2, 2006)*

Ziad also indicated that his department could not cope with pressure and demand from 160 schools with only 3 or 4 technicians. He also indicated that in order to reach schools and provide them with services on site, it might take *a week or more to find transportation to reach schools due to bureaucracy and shortage* [of related resources] (Ziad, November 2, 2006).

7.2.6 Interpersonal relationships VS qualifications and competence

In a clear sign of the awareness of the importance of employing peoples according to their qualifications and competence in performing certain jobs, a statement made by His Majesty King Abdullah II can be read on the walls of the Ministry of Education's offices saying: "Favouring unqualified people over others because of their influence is the most serious problem within any system."

Acquiring educational positions because of inter-personal relationships can impact the integrity and quality of educational reform as it is disseminated across the several levels of the educational system. Participants at several levels of the system reported the interference of interpersonal relationships as an obstacle to reform in general and to the integration of ICT in particular. A number of ICT training courses were made prerequisite for teachers' ranking and promotion, and therefore for salary increase. While

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this motivated teachers to undertake these courses, it also created competition among teachers as some of them sought using their influence and interpersonal relationships to be assigned to these courses. A teacher in Phase1 wrote:

> Teachers are assigned to some courses unfairly; older teachers use their interpersonal relationships to be assigned to some courses while they are about to retire. *(Q1:80)*

Maram, a senior official within the Ministry of Education, called "nepotism" *the main killer of any reform in the country* (Maram, November 6, 2005). She recalled a situation when a senior official from the Ministry of Education tried to use his influence to assign one person in order to fulfill a training position saying: *let's assign (…) as a trainer, pity he is in need and I know him* (Maram, November 6, 2005). In addition, during the process of planning for my interview with Omar, a senior official from the Ministry, I had to re-visit his office five times and reschedule my interview for several reasons (e.g. his other commitments and forgetting my appointment). During these visits, I had an opportunity to speak with trainers and other officials at his office, sometimes when he was absent. Waleed was one such person I ran into on four occasions at Omar's office. He was a trainer with the Intel course and he maintained a close relationship with Omar. In one of these meetings, I carried out the following dialogue with him:

> **Researcher:** what is the main requirement for someone to become a trainer?
>
> Waleed: (*laughed and swiftly replied*): to know this person! *[Referring to Omar who was absent at that time].*
>
> **Researcher:** aren't there any criteria for selecting teachers' trainers?
>
> Waleed: Yes! Of course there are requirements but knowing an influential person overpowers all that.
>
> **Researcher:** what are these requirements?
>
> Waleed: there are a few, first to receive 80 hours of training by Intel, develop a portfolio during the course, have a strong personality, to be selected by a committee, and knowing influential people, of course!
>
> (Waleed, December 26, 2005. An unscheduled dialogue)

Furthermore, there was high competition among teachers to be appointed as teacher trainers as it promised good money rewards compared with teachers' typical wages. For instance, Intel trainers used to receive 6 Jordanian Dinars per hour (1 US$ = JD 0.7) considering that the average monthly salary of a two-year in service teacher was around JD 200. In another incident, Waleed and I were waiting for Omar at his office and Waleed was trying to find a teacher who could teach Omar's son that day for an Arabic exam and in return, Waleed was most certain that this *volunteer* would be selected to become a trainer. So, he tried to call three of his friends in order to *make them a favour*.

7.3 Summary

This chapter has presented findings from investigation at the regional directorates of education and Ministry of Education levels. Several issues have emerged regarding ICT integration across the educational system, and this chapter has represented these issues in two main categories: issues associated with the decision for ICT integration, and issues regarding the implementation of the decision. While the decision for ICT was well rationalised and appeared to be straightforward, the implementation appeared to be challenging and fragmented.

The nature of the Jordanian educational system and its capacity to implement large-scale education reform appeared to have significant impact on reform outcomes. The findings also illustrate difficulties for the Ministry of Education to manage and sustain a large-scale educational reform with its current capacity, especially when external partners are involved in such complex processes. The chapter has identified several issues regarding the context of the educational system and its impact on ICT integration. In addition, several issues were identified regarding the involvement of external partners in educational reform and its impact on ICT adoption and integration across the educational system. Furthermore, it became clear that the several layers of the educational system were overstretched as they were trying to manage and implement such large-scale reform with limited capacity. While the involvement of international partners helped in accelerating the development of e-contents and training, it also resulted in unbalancing

the reform by injecting extensive resources into these areas while others were overlooked and under-resourced, especially maintenance and follow-up.

In Chapter 8, which follows, I will discuss findings from this chapter and integrate them with previous findings from Chapter 5 and Chapter 6.

Chapter 8

ICT integration: complex within complexity

> *The main enemies of large-scale reform are overload and extreme fragmentation*
>
> (Fullan, 2000b)

Chapter 5 introduced an overview of the overall integration of ICT in 12 selected schools from the three regions of Jordan, which gave details about of the levels of ICT presence in schools in these schools. Chapter 6 and Chapter 7 presented findings from the two case studies. While Chapter 6 presented issues associated with school's uptake of ICT, Chapter 7 dealt with issues associated with the educational system beyond schools, including regional directorates of education and the centralised Ministry. The issues documented at all these levels illustrated the complex relationships between decision making at the Ministry level and the ways in which the reform was actually being implemented.

Several threads that have arisen in these previous chapters are brought together in this chapter where I discuss aspects of the complexity involved in ICT integration as it is implemented by the Jordanian education system. All research questions come into play here, as this chapter relates the outcomes of this research project to the original research questions in light of the existing literature. Issues will be centred on the three levels of the educational system: schools, regional directorates of education, and the Ministry of Education. This chapter deals with issues regarding the educational system's ambitious plans for ICT integration, the dissemination of the reform project across the educational system, and schools' uptake of ICT.

8.1   Schools' Adoption of ICT

This section explores issues related to the first cluster of the research questions concerning schools' adoption and implementation of ICT. Various aspects of school context, discussed in Chapter 6, will be related to schools' adoption of ICT. Some of these issues arose from the literature, as discussed in Chapter 5 and further investigated in chapters 6 and 7, while other issues either emerged or further highlighted during the course of this study, particularly during Phase2.

Three major themes are discussed next: school leadership, school readiness, and teacher issues, as all three appeared to interact within the school context and then influence schools' overall uptake of ICT.

8.1.1   School Leadership

It became clear in the course of the current study that school heads who have strong personality, good interpersonal relationships within the system, and who are strongly supportive of ICT integration can substantially facilitate schools' adoption of ICT. As indicated in Chapter 6 (section 3.2), Al Fajr School had an enthusiastic principal with good interpersonal relationships at the directorate and at Ministry levels which resulted in the school receiving all that it needed from the directorate of education in respect of ICT tools and training. On the other hand, the change of principal at Al Noor School clearly affected the whole process of ICT integration in the school. The former principal (Ali) had been supportive of ICT in the school with enthusiasm and a positive attitude towards ICT. However, his replacement did not share the same enthusiasm and attitude towards ICT, which impacted negatively upon the school's adoption of ICT. The utilisation and implementation of ICT was left to teachers' own assessment and enthusiasm. In addition, and unlike the previous principal, the new principal did not pursue technical and maintenance issues with the directorate of education, and this, too, reflected upon the school's ICT-readiness.

The key role of school principals, as it emerged from this study, confirms earlier studies which indicated that the presence of knowledgeable and fully-committed school

leadership is an important precondition for successful integration of innovations in schools (OECD, 2001a).

8.1.2   School ICT-readiness

School ICT-readiness reflected upon the overall adoption of ICT by school members. Several issues emerged here, including infrastructure and access, overcrowded classrooms, and the role of computer lab coordinators.

8.1.2.1   Infrastructure and Access

Infrastructure and access to ICT in schools for teachers and students are crucial issues for ICT integration. The provision of ICT to schools has to be accompanied by ensuring ease of access to ICT at the school level, as quantitative indicators can be misleading and inaccurate in representing the *actual* ICT use.

Two main issues were identified in regard to access to ICT at the school level: quantity, and quality of access to ICT in schools.

Quantity

Despite the fact that increasing the number of computers in schools does not automatically increase teachers' and students' use of these machines (HanneleNiemi, 2003), proper access to ICT is a precondition for ICT integration and without it there is no chance for success (Shuldam, 2004). As discussed in Chapter 5 and Chapter 6, there was inequality in providing schools with computers if we consider student numbers. While Al Fajr School had a ratio of 10.78/1 students to computers, this ratio was 21.5/1 in Al Seel School and 16.6/1 in Al Noor School. As discussed earlier, the impact of limited access was evident and reported in Al Noor School (Sami, Jameel and Yousif).

Nevertheless, the number of computers in schools should be considered in light of two main points: first, the number of computers does not reflect the actual utilisation in teaching and learning. Second, even with a reasonable number of computers in schools,

access to these tools can be highly influenced by other school factors (e.g. leadership, computers' location, and the support of computer lab coordinators).

Quality of access to ICT in schools

The quality of ICT available for teachers and students emerged during teachers' utilisation of e-content. Despite the remarkable progress in developing supplementary e-content for textbooks, accessing this context was an obstacle to benefiting from them. Slow Internet connection was a major quality issue, which limited teachers and students in accessing what the Internet can offer (Q1:118). This was made clear by Sami when he indicated that he preferred a one hour of fast connection to permanent but slow connection (27 October 2006). The limitations of Internet connection were also apparent during Jameel's and Reem's classes where each teacher wasted 15 minutes (one-third) of their lesson trying to overcome networking problems.

Furthermore, as illustrated in Chapter 6 (section 3.1.2), the location of computers in schools has a direct impact on the ease of access to these machines by teachers and students. Even in the best equipped schools in the country, confining computers to computer labs clearly restricted teachers' and students' utilisation of the available computers. Al Noor School exemplified this issue, where teachers, even those who were keen advocates of ICT in schools (Sami and Jameel), were unable to use computers more than once a week or every two weeks because computer labs were the only access to computers in the school. Furthermore, Sami was concerned that if more teachers receive ICT training, he would not be able to maintain his access even once a week. The restriction of ICT in schools to computer labs can also contribute to viewing computers as precious technology, and can reduce the possibilities for computers to be seen as educational tools for everyday use. Such restriction can also increase computer anxiety, through which a negative relationship to the use of computers is developed by teachers and students (Rogers, 2003).

However, the study showed that freeing computers from the restriction of computer labs could increase students' and teachers' chances to use them. This was clear in Al Fajr School where a small number of computers at the library and in science labs clearly

increased teachers' and students' access and utilisation of ICT in the school. This was further highlighted in Al Wefaaq School where four computers were placed in the hallway and during the recesses students used them.

Therefore, enabling teachers and students to access ICT outside computer labs in schools can facilitate the overall diffusion of ICT at the school level in two ways:

- It can ease pressure on computer labs as it was clear from the experiences of Al Fajr and Al Wefaaq schools.
- It can provide better access for larger numbers of teachers and students in schools (Samar and Leila).

8.1.2.2 *Overcrowded Classrooms*

Reports have revealed that 20% of Jordanian students are currently studying in overcrowded schools (World Bank, 2003b). During the course of the current study, the issue of overcrowded classrooms became clear and its impact on the implementation of ICT was evident. Even teachers with obvious keenness to utilise ICT in Al Noor School were struggling with large student numbers of 45-55 per class (Ali, Jameel and Yousif). On the other hand, this was not mentioned as an issue either by the teachers or the principal of Al Fajr School as the school has a relatively reasonable number of students (30-35) in classrooms. During lessons, teachers seemed to have a good control over activities and pacing (Leila and Samar); there was enough space for students in the classroom; and the teacher had time to engage students in the lesson and to become involved with the learning process (Leila).

One major implication of overcrowded classrooms is that the teachers will be able to develop less knowledge about individual students. According to Cohen and Ball (1999), the instructional capacity of teachers is partly a function of what they know about students; what students are capable of doing as well as how to take advantage of it. According to Dusick (1998), during teachers' early stages of adopting ICT, they need additional training on class management, as during the early stages of adopting ICT, teachers often face problems similar to those faced by novice teachers: discipline,

resource management, and personal frustration (Sandholtz *et al.*, 1997). This was apparent in Jameel's classrooms as he struggled to pay attention to all students, especially those seated in the back rows of the classroom. Moreover, overcrowding in classrooms can add pressure for teachers and can inflame their anxiety, especially when dealing with ICT as they have to dedicate extra time for technology itself as a new component of the classroom. It became evident that when teachers are faced with extra pressure such as large student numbers or technical failure during their implementation of ICT, they are more likely to return to their old and familiar methods of instruction. This became apparent when Jameel would respond to students' distraction and noise by shifting his teaching to a more teacher-centred approach through lecturing to the whole class. However, teachers' handling of overcrowded classrooms was substantially varied, as Sami, for example, indicated that he did not believe that student numbers in classrooms is an issue and that when the teacher knows how to deal with overcrowding it ceases to be an issue.

8.1.2.3 *Computer lab coordinators: the gatekeepers*

The crucial role of computer lab coordinators became evident during the course of this study. These coordinators were responsible for maintaining the functionality of computer labs in schools and reporting machines and network failure. They were mainly computer science graduates and they were able to help teachers during classes to overcome some technical and networking problems. The importance of computer lab coordinators in schools has been highlighted in recent years. For instance, the role of this person has shifted in most European countries from purely technical support to the organisation of ICT in schools, and the provision of pedagogical ICT support in some countries (European SchoolNet, 2005). However, it became clear during the course of the present study that the role of this person in schools was generally underestimated by schools and by other levels of the system.

In my observations, the computer lab coordinator appeared to have a vital role during lessons. This person can help teachers during the lesson to overcome technical problems which can reflect upon their teaching. That is, teachers can find time to spend on teaching students rather than on resolving technical problems. An incident referred to

earlier, illustrates this issue, where Jameel spent 15 minutes (one-third) of his lesson trying to overcome technical problems because the coordinator was not present at that time helping a teacher in the other lab. Furthermore, it also became evident that one computer labs' coordinator in large schools is likely to become overwhelmed by the demands from teachers especially when there are two lessons in different labs at the same time as such schools had 3-4 labs with one coordinator. Despite providing Al Noor School with two more computer labs, the coordinator's position remained vacant for more than two months and the dust was *accumulating on the machines* (Jameel).

8.1.3   Teacher issues

Issues associated with teachers' adoption of ICT appeared to be pivotal for the overall integration of integration. These issues included teacher resistance, teacher competence, teaching and learning, and the impact of early adopters in schools.

8.1.3.1   Teacher Resistance

Teachers were still being blamed by officials from other parts of the educational system for not being competent or willing to embrace ICT integration. This finding echoes earlier studies which documented a 'blame the teacher' tendency amongst initiators of educational change (Cuban, 1993; Doyle *et al.*, 1977; Fullan *et al.*, 1991; Lai, 1993). King (2002), too, stressed that resisting change is a state of mind for many teachers and one of the most difficult barriers to effective ICT implementation. However, usually resistance in educational organisations is treated as a practical difficulty that requires remedy, rather than as social phenomenon which requires investigation and inquiry (Doyle *et al.*, 1977).

Investigating teachers' resistance to the adoption of ICT needs to go beyond practical issues to explore more deeply the reasons for such resistance. Teacher resistance could be linked to uncertainty which results from a lack of predictability of structure and information (Rogers, 2003). Thus, teachers may resist ICT not because of doubts about its value or effectiveness but because various issues engulf their work as teachers. This study has revealed some of these issues, which include: teaching overload, low pay, lack

of proper training, absence of follow-up and ongoing support, quality of leadership and support, and the quality and quantity of infrastructure.

Although some officials (Kawsar and Ziad) continued to blame teachers for their resistance and unwillingness to adopt ICT in their teaching, the overwhelming majority of teachers (95.6%) in this study reported their awareness of the usefulness of ICT for their instruction. Nonetheless, this study did reveal that there were still *pockets* of resistance or lack of enthusiasm to implement ICT on the part of some teachers. As illustrated in Chapter 6 (section 3.1.2), Yousif was forcefully critical of ICT integration because, in part, he did not have time to spend on preparing ICT-related activities due to his commitment to a second job as a private tutor and his realisation that ICT integration needs more time for preparation. This can be linked to previous studies which indicated that ICT integration in education does not make teachers' job easier (Dwyer *et al.*, 1991); rather, it requires more work in terms of preparing ICT-related activities to be used in connection with lessons. However, due to the low wages of teachers, they are increasingly pressured to work after hours, which can leave little time for them to prepare for teaching considering that teachers usually prepare for their next schooling day at home after school hours. Therefore, being committed to a second job would certainly be at the cost of time allocated to preparing and exploring with ICT. Yousif and Jameel acknowledged that this was the case and they explained that allocating additional time to preparing ICT activities would reduce the time available for their second jobs, which they were not able to afford. Accordingly, this situation makes it *unrealistic* to expect an appropriate implementation of ICT by teachers when they strive to maintain balance between their personal commitments and their profession as teachers (Fullan, 1982).

The complaints and resistance reported in this study thus appeared to be associated not with ICT itself, but with the context in which ICT was being integrated and the efforts spent to facilitate teachers' adoption of ICT. This confirms an earlier study which identified "poor working conditions" for Jordanian teachers as a major threat to implementing education reforms (Alshurfat, 2003, p.170). The wider literature has also linked teachers' working conditions to their productivity and implementation of innovations (Castells, 1999a; Fullan, 2003a). A failure to address basic working

conditions for teachers can threaten the early accomplishment of educational reforms, as teachers may become disengaged from reform in the long term (Fullan, 2003a).

8.1.3.2 *Teacher Competence and professional learning*

As indicated earlier, there are two levels of ICT competency for teachers: learning about ICT in order to master ICT for themselves, and learning to make most of the possibilities ICT offers to students (European SchoolNet, 2005; Pearson, 2003). Rogers (2003) indicated that even after the decision has been made to adopt an innovation, 20-25% of implementers' time at work is required for them to develop proficiency in using it. Teachers need to first master ICT skills, and they can shift their focus from ICT itself to more innovative instructional methods (Dwyer *et al.*, 1991).

According to Navarro and Verdisco (2000), dealing with teacher issues has all the characteristics of the most difficult problem that faces educational policies. Thus, it has been recommended that 30% of a school development budget should be allocated to staff development (Harvey *et al.*, 1995). Nevertheless, teacher training in Jordan received approximately $US 300,000 (1.36%) out of $US 22M the total spending on the JEI, which is a significantly small amount (McKinsey & Company, 2005). While this might be justified as the reform was in its early stages and there was a need to provide schools with infrastructure, it remains an indication of the existing balance in investing the educational dollar. Earlier studies stressed that more attention should be paid to teachers, or the *brainware* of ICT integration, as this has a longer and more pervasive impact on the integration than software and hardware (Farenga *et al.*, 2001). There is also a growing belief that investment in teachers' knowledge and skills results in greater improvements in student achievement than does any other investment in educational interventions (National Commission on Teaching & America's Future, 1996). However, dealing with teacher issues is a complex task. That is, these issues are "politically and ideologically charged; their financial implications […] are huge" (Navarro *et al.*, 2000, p.3). In addition, the ambiguity of skills required for teachers to become competent in ICT adds to the complexity of the task (European SchoolNet, 2005; Navarro *et al.*, 2000; Rudd, 2001).

Teachers in this study reported an extensive reliance on one-session courses and workshops for their ICT professional development (Sami, Reem and Najah). When Reem tried to implement what she had learnt in one-session workshop on using the new English Interactive Online (EIO), her disappointment was clear, especially in light of the complete absence of follow-up during her teaching. Indeed, this approach without follow-up has been labelled as the least effective one, as well as the least cost-effective in terms of what teachers develop and implement from such short courses (Sun *et al.*, 2000). Teachers need time to master and practise new skills in order to be able to pass them on to students.

It is unrealistic to expect teachers to teach students skills they themselves do not practise. For instance, collaboration and team-work were stated by the Ministry of Education to be important skills for students to achieve in order to be able to participate in the new era, and this was one of the goals of reform (Ministry of Education, 2001a). Likewise, considering that teachers were not regular users of ICT in their personal lives (Leila and Samar) or in schools (Yousif, Jameel and Reem), it is less likely that they would be keen to utilise ICT in their instruction and to encourage students to utilise ICT.

The system's approach of providing teachers with ICT professional development showed clear fragmentation. Participants reported the absence of national standards for ICT training courses (e.g. ICDL, World Links, Intel) which had been internationally developed. Each of these courses was responsible for developing its own standards, which added to the fragmentation. Benefiting from the experiences of other countries such as Denmark, France, Hungary and Switzerland (European SchoolNet, 2005), the Jordanian educational system can develop its own *national ICT certificate*. The developing of national standards for international courses operating within the educational system could make ICT training less fragmented through compelling the international ICT training courses to meet the national agendas and standards.

Despite making remarkable efforts to train teachers, as may be seen by 98% of teachers having reported undertaking ICDL course, 24% of teachers in this study requested more

ICT training. These demands related both to ICT skills as well as ICT pedagogic skills. School heads (Ali and Hiba) and other stakeholders (Sahar and Basil) also stressed the need for more ICT training for teachers. Predictably, when teachers do not know how to utilise ICT properly and they are required and pressured to use it by the system, they are more likely to use it in a superficial way and this was apparent from Samar's utilisation. Teachers might also tend to use particular features of ICT that can be easily observed by outsiders instead of selecting features that have more instructional value. Consequently, ICT integration may remain on the surface without touching its essence or exploiting its powerful functions. Kozma (1991) warned that no matter how powerful a technological medium is, and what capabilities and features it has, all these features become useless if they are not used. A particularly powerful function of ICT is the ease of communication and interaction facilitated by email and the Internet. However, this feature was not taken up by most teachers as 95.7% of teachers who participated in this study indicated that they did not use ICT for "communication". This echoes an earlier report by the World Bank (2003b) which indicated that the flow of information between the departments of the educational system was "unsatisfactory" and document-based rather than via electronic communication. Therefore, for some teachers, ICT integration was reduced to only converting textbooks to digital materials and presentations (Samar and Jameel). Even with the most enthusiastic teachers of ICT there was no use of the "communication" functionality of ICT. This was evident when Samar informed me that she did not have an email address and Leila revealed that she had not checked her email for more than two months.

8.1.3.3   *The Clash: Teaching and Learning*

One of the main objectives of the Jordanian education system in implementing ERfKE was to provide students with "the ability to work using the computer and employing technology effectively" (Ministry of Education, 2004, p.19). However, the practice of the reform shows a marked discrepancy between identified goals and classroom practices. It appeared that there was greater emphasis on teaching rather than on learning, and that the focus was often on teachers', rather than students' use of ICT.

Typically, students continued to be taught in the traditional way, sitting in rows in the classroom (See Figure 8.1), being lectured by teachers *using blackboard and chalk* (Sami, December 30, 2005), and without any presence of ICT in the classroom.

Figure 8.1:   Inside one of Al Noor School's classrooms

In lessons where teachers did have access to ICT through a laptop computer, this resource was generally used either for teacher presentations which were often merely a digital version of a traditional class, or for teachers' own in-class access to the Internet. In both cases, this resulted in a continued focus on teaching at the expense of learning.

Even during lessons which were held in computer labs and where students could have access to hands-on learning, teachers' utilisation of ICT was influenced by their conventional instructional strategies. For instance, Jameel often used to switch to a teacher-centred mode by asking all students to listen to him while lecturing the whole class. Clearly, changes in focus from teaching to learning are less easily achieved when roles have become fairly settled over the past century or more (Cuban, 1993).

In the Jordanian context, a focus on students which took into account their individual difference and varied levels of ICT skill was also more difficult to manage because of the large numbers of student. This may be seen, for example, in Jameel and Samar's classes, where the teacher often switched to lecturing the whole class rather than giving students chances to explore and engage with hands-on experiences with ICT.

It may be said, therefore, that, the introduction of introduction of ICT as a new medium for teaching and learning in classrooms needs to be considered in the broader context of existing teaching and learning practices. New modes of technology may require fundamental changes in teachers' beliefs about the way in which they position students and conceive of learning (Dwyer *et al.*, 1991).

8.1.3.4   *The presence of early adopters in schools*

The introduction of any innovation into an organisation is likely to receive a variety of responses from its implementers ranging from enthusiasm and adoption to resistance. It has been found that the early adopters of innovations in organisations can have a significant impact on the survival of an innovation. Rogers (2003) argued that these "champions" quickly overcome indifferences or resistance an innovation might provoke. These early adopters can be seen as "experts" by other teachers as they had already trialed the innovation and they have just come "from the trenches" (Watson, 2001, p.185). It may thus be worthwhile to invest in actuating the role of early adopters of ICT in schools in order to accelerate its diffusion and adoption by the more "laggard" teachers as it became clear that these early adopters can encourage other teachers' adoption.

In this study, Sami and Leila were early adopters of the new technology. Sami was known in his school as "the father of computer" because he was an advocate of the integration of ICT in the school and was a regular user of computer labs. Even teachers of other subjects attended his classes in order to observe his use of ICT. Leila is similarly an early adopter of ICT, who sought ICT utilisation in her instruction even before the Ministry launched its intervention. In both cases, colleagues showed their interest to learn from these early adopters and consulted with them during their use of ICT. For instance, as indicated earlier, other teachers often visited Sami's classes to observe his

implementation of ICT in his instruction. Likewise, Leila had impact on her supervisor who was interested to learn from her utilisation of ICT.

The impact of early adopters on the larger community of teachers is difficult to gauge in conventional school settings where isolation tends to keep teachers in their classrooms with little interaction and cooperation. Only 21% of teachers in this study indicated that they had the chance to interact and observe other teachers while implementing ICT in their teaching. However, communities of practice for teachers can play a key role the diffusion of ICT through connecting teachers together where they can share their experiences as well as find answers to their daily questions.

It became clear that the interaction of the several issues associated with the school context, including school readiness and teacher issues, contributed to hindering or facilitating the overall adoption of ICT in schools. The following section will pursue issues associated with ICT integration beyond the school context.

8.2 The regional Directorates of Education

This section explores issues related to the second cluster of the research questions concerning the role of the directorates of education in ICT integration across the educational system. This will draw upon findings from Chapter 7 in order to shed light on the directorates' role, as the intermediate layer of the education system, in disseminating the Ministry's decisions and statements of ICT integration to schools.

As noted in Chapter 2 (section 2.2), reform projects are diffused through the regional directorates into schools. Therefore, this is a powerful layer within the educational system that influences the implementation of reform projects designed and adopted at the Ministry level. In this section I will discuss the role of the regional directorates in terms of: ICT professional development, follow-up, and maintenance and technical support.

8.2.1   ICT Professional development

Any fundamental educational intervention should consider teachers to be a key component of its success. Therefore, teachers' preparedness and capacity to implement educational interventions need to attract substantial attention from policy makers (Farenga *et al.*, 2001). ICT professional development, accordingly, is considered as the backbone of ICT integration as it supports teachers to adopt and implement ICT appropriately. The regional directorates are responsible for disseminating ICT training courses across the educational system.

Despite the reported overall satisfaction with ICT professional development courses they received (Ali, Hiba, Sami and Justin), many participants expressed dissatisfaction with several aspects of ICT training courses. The following three issues emerged during the course of this study regarding ICT professional development:

- Teacher Trainers;
- Training environment and timing; and
- Cascade model in disseminating training courses.

8.2.1.1   Teacher trainers

ICT training courses should go beyond developing isolated skills to linking them to teachers' own teaching (Granger *et al.*, 2002). Teachers not being able to link ICT to their own practices is at the heart of teacher anxiety about ICT (Harvey *et al.*, 1995). Therefore, qualified teacher trainers are a crucial component of successful ICT training courses.

A main constraint to achieving this occurs when ICT trainers are "experts" (Sherwood, 1993) in computer science with little or no teaching experience, which shifts the focus from pedagogy to technology. When teacher trainers are experts in both technical and pedagogical skills, they can not only facilitate teachers' learning new ICT skills, but also linking them to classroom settings. Good trainers should be able to move away from

theory to practice and to help teachers to implement what they learn in their classrooms (Maddux *et al.*, 2001).

However, it became clear that the central role of teacher trainers had been underestimated. As indicated earlier in Chapter 6 (Section 3.1.4), the selection of teacher trainers frequently involved interpersonal interferences rather than competence, which had a strong impact on the quality of ICT training (Maram and Q1:90). Teachers pointed out that teacher trainers were selected regardless of their qualification (Q1:88 and Q1:46). The impact of unqualified trainers can be severe in the context of ICT integration as teachers might abandon ICT in early stages of adoption only because they were not taught how to use ICT in their teaching. Eventually, this would have implications to the overall integration across the educational system.

8.2.1.2   *Training environment and timing*

It is unreasonable to expect teachers to implement ICT in classrooms when they do not have hands-on practices during their training courses where they can digest what they can learn by putting new skills into practice. In this way they can make sense of what they learn instead of dealing with abstract concepts. Teachers complained about the lack of proper ICT resources during training courses which prevented them from practising what they were being taught (Q1:41, Q1:81, Q1:116 and Q1:121). Understandably, such shortage of resources can have a negative impact when teachers are confronted with real classroom situations when they tend to use. Teachers are likely to find it a daunting task to implement something that they were not given the chance to digest properly during training courses.

Moreover, training courses should suit teachers with regard to timing and location of training. As indicated earlier, there were frequent complaints about the timing and location of ICT training courses as they were usually conducted after school hours or during holidays in central locations (Q1:75). It appears that, if ICT training is offered at the cost of teachers' own leisure time, they will not be keen to benefit from training, especially if it is of a mandatory value.

8.2.1.3 *Cascading ICT training*

As indicated earlier in Chapter 6 (Section 3.3) and Chapter 7 (Section 2.4), due to the highly centralised nature of the Jordanian education system, ICT training courses were disseminated through cascading. That is, a core team from the Ministry of Education trains core teams from the regional directorates of education who train mentors and teachers trainers in their directorates who then train teachers in the field. However, this model of diffusion was reported by participants as unsuccessful (Basil and Omar) as it substantially modifies the essence of the original course, which confirms earlier findings in the literature indicating that this approach usually produces "less-than-convincing results in practice" (Navarro *et al.*, 2000, p.4).

The process of diffusing an innovation across a multi-layered organisation, such as the educational system, can have impact on that innovation. This is in part due to the involvement of humans and resources at each of the several levels, and the long chain created between decision-making and implementation, which may modify and misshape the essence and contents of the original courses (Basil). Furthermore, the cascading model presumes that one-size-fits-all regardless of teachers' and schools' individual and unique needs, an approach which is also largely discredited in a complex context such as that of education.

8.2.2 Follow-up and ongoing support

As noted earlier, the regional directorates disseminate and oversee the implementation of decisions and policy statements made at Ministry level. As indicated in Chapter 2 (section 2.2), mentors are responsible for supporting, monitoring and reporting teachers' and schools' performance to the directorate. Therefore, mentors maintain the direct contact between teachers and schools on one hand, and the other parts of the educational system beyond school walls. Most importantly, mentors are the main part of the educational system that provide teachers with follow-up support during their teaching. Nevertheless, the present study found out that mentoring departments were markedly under-staffed and were unable to carry out their crucial role. As noted earlier, individual mentors were extremely overloaded as each was responsible for 120-130 schools (Rajab and Hassan). In addition, mentors were often removed from their mentoring role in order

to reinforce other fields within the education system (e.g. training and authoring), which deprived teachers of crucial support when they needed it most: to apply ICT in classrooms. Thus, the regional directorates' role was reduced to a superficial one which was confined to provision of ICT resources and the use of ICT for administrative tasks such as uploading students' names and marks to the Eduwave (Sami).

Teachers may abandon their newly developed skills during ICT training courses due to a perceived "incompatibility" with real teaching/learning settings (Fiszer, 2004). Teachers' ability to transfer what they learn during such courses relies heavily on follow-up, and it has been suggested that without follow-up, training will have impact on no more than 5-10% of participants (Bradshaw, 2002). Considering that the vast majority of teachers (95%) in this study reported receiving ICT training only in computer labs, follow-up is pivotal to ensure the transferability of skills developed during training into classrooms.

The struggle of teachers to implement ICT without follow-up was apparent. Samar, for example, simply reproduced textbooks in digital format. She was exhausting resources and efforts by asking students to reproduce lessons from textbooks as digital presentations without receiving feedback on the pedagogical value of her approach, and she was alone in attempting to evaluate her programme. Likewise, Reem struggled to implement in her classes what she had learnt during a workshop. A lack of follow-up support may leave teachers exposed and might lead to their abandonment of ICT in favour of conventional teaching with which they are familiar.

8.2.3 Maintenance and technical support

Maintenance, replacement and update are essential companions to ICT integration. This process of maintaining the functionality of ICT infrastructure in schools was frustrating (Ali, Jameel, and Yousif). Obtaining support was lengthy, time consuming, and services did not reach schools at times when they were needed. Even machines that were still under warranty had to go through certain bureaucratic channels to be fixed (Ali). This was further highlighted when Yousif and Jameel tried to get the laptops repaired (Chapter 6) through the directorate of education.

Clearly, directorates of education were working with limited capacity within a bureaucratic system, and this directly influenced the quailty of service provided to schools, with delays in providing technical support to schools due to staff shortage and bureaucratic decision-making. This was evident when Ziad explained that the process of obtaining authorisation for transport could take a week. At the same time, technical assistance is a key factor for implementing new innovations and can be a significant predictor of teachers' use of ICT (Fullan, 1982; Plomp *et al.*, 1996). In addition, Byrom (2001) found a significant positive correlation between the technical assistance provided and ICT integration, with schools that receiving more technical support being more likely to adopt ICT.

However, the pivotal role of the directorates of education for ICT integration was noticeably overlooked by the educational system. Due to their closeness to schools, the directorates should be empowered with a degree of autonomy under the guidance of the Ministry of Education. As directorates are the direct contact between the Ministry of Education and schools, they can provide informed decisions and more sound interventions to schools. With greater autonomy, the directorates, through mentors, could efficiently target teachers' and schools' needs during their integration of ICT. However, little of this will be possible if understaffing continues.

8.3 Ambition with scarce resources; the story of a developing country

This section explores issues related to the third cluster of the research questions concerning the role of the Ministry of Education in ICT integration across the educational system. Findings from Chapter 7 will be drawn upon in order to shed light on the role played by the Ministry of Education, as the central educational authority, in the diffusion of ICT to schools.

Chapter 2 painted a picture of the Jordanian education system and its highly centralised nature. The next section links several aspects of the educational system, discussed in Chapter 7, to their impact on ICT integration across the education system. The section

discusses the following issues: the knowledge society and its development, creating balance between pressure and reality; the involvement of "others" in national reforms; coordinating efforts, top-down reform, planning, and the implementation and sustainability of reform.

8.3.1 The Knowledge-based economy and Development

The emergence of the new knowledge-society has reshaped the discourse of relations between developed and developing nations. Even economically poor nations themselves use the classifications of nations (Todaro, 1985), such as developed and developing countries, especially in their negotiations with economically rich nations on controversial international issues. Currently, for instance, this has been the case in the debates and negotiations over the controversial roles of developed and developing countries in greenhouse gas emission.

The discourse regarding the ways in which nations are classified may represent a notion of 'underdevelopment' in ways that suggest a deficiency to be remedied (Appleby, 2005). Usually, the remedy has been prescribed and delivered by foreign aid and by introducing more "advanced" foreign practices (ibid) based on Western values. Development discourses suggest a classification of nations that tends to impose "a single standard of economic and political success to which all nations must aspire" (Spurr, 1993, p.110) which are usually the experiences and standards of developed nations. Therefore, the intervention of international aid agencies and other countries has been promoted as an attempt to help developing countries to draw alongside the more developed nations by providing them with financial assistance and expertise. However, after decades of international aid programmes, the gap between developed and developing nations has not diminished; rather, economic disparity has increased between OECD countries and the rest of the globe (Castells, 1998).

The impact of ICT on economic imbalance
The information technology revolution has added new elements to the discourse over 'underdevelopment', as the 'digital divide' has added another dimension to the

classification of nations. The pervasiveness of ICT has created the "network society" in which countries are struggling to stay connected to the global network, where valuable people and territories are switched on, and devalued ones are switched off the global network (Castells, 1997). Nations with greater access to ICT are believed to have a greater chance to capitalise on the potential benefits of the knowledge-based economy (Castells, 1999a; Mansell *et al.*, 1998) while poorer nations risk being left in the dark. Accordingly, there is seem to be a digital 'deficiency' in developing nations, which can be remedied by the richer nations through expertise and financial assistance. This new trend focuses on bridging the digital gap between developed and developing nations.

Countries worldwide are becoming more willing to invest in e-learning, hardware, software, networks and training (Mansell *et al.*, 1998). As indicated earlier, Jordan, like many educational systems worldwide, has initiated several initiatives aiming to accelerate ICT integration within society in general and within the educational system in particular. Consequently, education itself has become a part of a huge global market with increasing competitiveness between international businesses (Hepp *et al.*, 2004). Even local companies in Jordan are attracted by the transfer of resources from global partners, as well as by the business potential for exporting their products (e.g. e-contents) to foreign markets starting from Jordan (McKinsey & Company, 2005).

Public-private partnership

Due to the scarcity of resources available for educational development in developing countries, embracing ICT is an immense challenge, and therefore, financial assistance and expertise are increasingly sought through building partnerships between public education and the private sectors. However, the limited capacity of the private sector locally in developing countries, such as Jordan, in terms of resources and expertise, pressures educational systems to expand such partnership to the international private sector.

This study has documented the shift towards involving the private sector in development projects under the banner 'public-private partnership'. While offering some benefits to developing countries, however, this kind of partnership, which has been further

stimulated by globalisation, may also be seen as offering companies to extend their reach more readily than ever before.

After the end of the colonial era, large international private companies from developed countries often penetrated local markets through local private affiliates or under aid proposed to economically poorer nations. Astonishingly, a growing number of large international enterprises have established development or aid affiliates, which act as a means for these enterprises to penetrate new markets through aid projects which can give them greater access to developing countries (e.g. Cisco Systems has established *Cisco Institute* and Intel has established *Intel Education Initiative*). This new trend of involving the affiliates might project a new strategy in expanding businesses and influences globally under the cover of aid and development.

Developing countries in general and educational systems in particular should be cautious of a "shaver-and-blades" strategy in adopting educational interventions such as ICT integration. In this strategy, the hardware ("shaver") is sold to users at a relatively low price, or even provided free, in order to capture market share, and then the software ("blades") is sold at a relatively high price. Globalisation has paved the way for large companies to expand and to find new markets, and therefore they might use such strategy to gain ground in new markets. In the context of ICT integration, this might determine the overall success and sustainability of the integration.

Understandably, private companies may find it profitable to fund and assist projects that can be financially promising in the short or long term. For instance, a computer company is likely to be interested in supporting ICT integration into schools, as these computers and related technologies will continuously need upgrades, maintenance, replacement and software. Therefore, if a company provides a given educational context with computers (the shaver) this will ensure that the company has a share in the recurrent spending on these machines. As indicated earlier, many local and international businesses supported both ERfKE and JEI. Under the JEI initiative, mathematics teachers in the Discovery Schools were provided with laptops through donation from international partners, in a clear illustration of this principle.

Furthermore, the involvement of different kinds of partners in the development of educational reform projects can have impact on the effectiveness of such projects. Usually, the range of partners, including diplomats and politicians, development bureaucracies, NGOs, implementers and participants, means that various objectives are sought (Appleby, 2005). While the announced objective of aid is development, other unannounced objectives might be designed to support the political, strategic, military, and commercial objectives of those donor countries and agencies (Escobar, 2004). For instance, Jordan's political stance in the 1990/1991 Gulf War had implications for the country's relationships with other countries which held different political stances. Accordingly, external aid from these countries to Jordan was critically affected. Such fragile relationship involving aid and development might have severe consequences on national projects it is often governed by commercial interests.

Jordan has been involved over the last few decades in several educational reform projects, which involved international aid agencies, particularly the World Bank and UNESCO (e.g. Global education, HRDSIL I and HRDSIL II). The ERfKE reform project and the JEI initiative are the latest projects involving the World Bank and other international partners. Various international and local private companies are also involved in the two interventions under the umbrella of the World Bank. As noted earlier, the World Bank itself has been directly involved in the implementation of ERfKE through the Development and Coordination Unit (DCU).

8.3.2   Creating Balance: Being Realistic and Dealing with Pressure

Successful implementation of innovations requires clear and realistic aims, in terms of time, resources and support (Fullan, 1982). Ignoring the capacities and limitations within a particular context might leave the whole intervention meaningless or burdensome as it would not be executed as intended. It became clear, during the course of the current study, that the Jordanian education system was overstretched by the fast pace and magnitude of the educational intervention. Thus, it seemed difficult for the system to

simultaneously maintain its efforts in all aspects of reform with efforts often being diverted to those parts of the reform where the demand was most pressing, leaving other tracks exposed. In the beginning, there was a remarkable emphasis on developing e-contents which required the allocation of disproportionate resources. However, when the e-contents for some subjects became available and were uploaded to the Eduwave online portal, *the Ministry realised that teachers were not prepared to use them* (Basil, December 13, 2005) due to the lack of training and sufficient infrastructure. At that point, the training track was accelerated and new ICT training were rushed into the scene. The same response recurred when mentors were mobilised to train teachers on using ICT in teaching subjects, which resulted in diminishing their crucial role in follow-up and providing support for teachers in classrooms. Later in the study, it was clear that the focus had shifted yet again to authoring new curricula which showcases ICT as supplementary to textbooks, thus, many mentors were redirected to support the department of curricula in the Ministry of Education.

Furthermore, it also became clear that the education system was unable to maintain its efforts over an extended period of time, which resulted in *patchy* intervention. During the first year of implementing the E-math, mentors' visits and support to schools and teachers were remarkable. Participants reported mentors' visits to schools and teachers daily or four times a week in the Discovery Schools. However, this was at the cost of support and follow-up in other non Discovery Schools. This issue was further highlighted during the second and third year of implementing ERfKE, as mentors' visits to schools subsided to only once or twice a year (Hassan and Rajab). Furthermore, there was not sufficient Internet connection to maintain connection to all schools at the same time. Therefore, when a Discovery School was visited by officials or stakeholders other schools had to be disconnected in order to provide fast connection to the visited school (Ziad).

In sum, the integration of ICT had taken a fast pace considering the capacity of the educational system. Consequently, the various departments concerned with the implementation of reform habitually responded by mobilising their efforts and resources to the most demanding aspects of the reform at the cost of others. This pattern of the

educational system's response to pressure and demand can be explained by one or more of the following rationales:

1) The limited capacity of the Ministry's human resources. This became apparent when mentors had to be mobilised to either authoring new curriculum or training teachers, which left teachers without follow-up and support.

2) The ambiguity of ICT integration stages, which was apparent from the Ministry's response in a *quick-fixing* fashion when a weakness or a need emerged. For instance, teacher training was accelerated after the e-content was uploaded online and following the realisation that there were no adequate resources or training for teachers which would enable them to utilise these materials.

3) Unanticipated situations that can cause turbulences within the educational system at certain times. This became apparent when the system received large numbers of students as a result of immigration from private education to the public sector as well as the arrival of 60,000 Iraqi refugee students at the beginning of the schooling year. This sudden and unanticipated increase in student numbers caused a significant shortage of the newly developed textbooks and a dearth of physical infrastructure in schools that received new students, which were concentrated in Amman.

8.3.3 Compromising the reform: the involvement of others"

While it might be inevitable for the Jordanian education system to seek financial and expertise assistance from international partners in order to undertake major reform projects, the involvement of these partners should be approached with caution. Although Jordan is considered a small country, it has the potential to serve as a springboard for replicating its experiences to other Arab-speaking countries in the region, which together form a population of more than 325 million. This was an explicit factor that encouraged

international investment (e.g. USAID and Middle East Partnership Initiative) in the country and probably decided large global corporations to join the reform (McKinsey & Company, 2005). The involvement of these international partners in such projects appeared to have certain effects during planning and implementing the project. The current study revealed two main aspects of this issue:

1) The Ministry had to be conscious of participating partners' timelines, agendas, and their desire to focus on some aspects of the reform rather than others during planning and implementation. In the beginning, the Jordanian Ministry of Education had to negotiate the timeline of the ERfKE with the World Bank as a main partner in the project. As the World Bank did not agree on the 10-year plans proposed by the Ministry, the project was separated into two phases of five years for each stage (Ruba).

2) The Ministry does not have control over the flow of funds in order to sustain all stages and aspects of the reform. Due to the involvement of international partners, the Ministry did not have complete control over the conditions in which these partners became involved in the project, especially when these partners were involved in the project under the umbrella of 'aid'. For instance, as noted earlier, laptops distributed to teachers were donations and *they were not under warranty* (Ali, December 15, 2005) and *you could not imagine someone gives you a gift and when the machine breaks down you ask him to repair it* (Ziad, November 2, 2006). Therefore, when most of the laptops broke down only one year later, they were simply withdrawn from schools without replacement.

Furthermore, the involvement of international partners seemed to steer the reform in certain directions according to the interests of key players. It seemed that the education system faced a dilemma: while it had to maintain its focus on educational outcomes from ICT integration across the educational system, it had to be other-conscious in planning and implementation. Often, this consciousness took the form of overemphasising even manipulating some achievements in order to keep the fund partners supportive to the reform, which might be due to trying to strike balance between the reality on the ground

on one hand and the attempt to promote certain achievements to partners on the other. This became clear when a senior official in the Ministry requested that changes be made to the figures of a statistical report about the numbers of computers in schools, because the true figures were not *representable* (Samir).

Furthermore, it is worth considering that ERfKE (Educational Reform for the Knowledge Economy) is an English abbreviation despite the fact that it was intended to be implemented in Jordan, an Arabic speaking country. In addition, the Jordan Education Initiative's website was in English and there was no Arabic version (www.jei.org.jo, last accessed on October 10, 2007). This can give an indication of the intended audiences, and the position of the local Jordanian partner.

The current study revealed two main areas where international and private partners were particularly involved:

        (a)   E-contents

        (b)   ICT professional development

The two areas are discussed next.

(a)   E-contents

As noted above, in the course of this study, it became evident that the agendas of external partners could have impacts on the educational intervention in a way which might serve their short or long term interest. This was seen in the extraordinary fast pace at which the development of certain e-content was progressing, which left all other tracks (e.g. training and infrastructure) lagging far behind. The e-math content was created by Cisco Learning Institute and Rubicon, a Jordanian local private company, and was sponsored by Cisco Systems. However, this investment was aligned with Cisco Systems' long-term commercial interest (McKinsey & Company, 2005) which was motivated by the opportunity to develop e-content to be useable and trialed within a real school context. In this way, other education systems, especially those of other Arab countries, might then be convinced to adopt the developed 'product' as it would have been already trialed in a similar education system. Similarly, the "I Love Physics" digital material was bilingual

English and Arabic, which might suggest that the materials were developed for the Jordanian system with an eye on the larger regional market.

Furthermore, after the development of the e-math contents, the private company which developed the materials became engaged in a fierce legal dispute with the Ministry of Education over the copyright issue (Omar and Maram). During the course of the study, the issue had not been resolved, which was causing delay in the implementation of the integration (Omar). However, there was an initial agreement that enabled the private company to retain the copyright outside Jordan while the Ministry of Education reserved the copyright within Jordan (Maram). At the same time, other subjects did not receive the same attention and therefore they were significantly slower in their progress, especially civics and geography (World Economic Forum, 2004). Understandably, mathematics has a relatively universal nature with minimal cultural and local impact on localised curricula, and therefore, it is more easily transferred from one educational context to another. Likewise, English as a Foreign Language contents might be easily transferred from one context to another. On the other hand, civics and geography have more to deal with the local context and it can be difficult to transfer them from one particular context to another due to cultural and contextual factors.

(b)   ICT Professional Development Programmes

As noted earlier in Chapter 2, and discussed further in Chapter 6, the main ICT training courses which provided professional learning for Jordanian teachers were ICDL, World Links, iEARN, and Intel Teach to the Future. These courses played an important role in training teachers on ICT. However, it is also clear that all these international courses are provided by either profitable companies, or by politically-driven organisations. As indicated earlier, iEARN is part of the Building Respect through Internet Dialogue and Global Education (BRIDGE) which aims at bridging the cultural divide between the USA and Islamic countries (BRIDGE, 2004) and funded by the US Department of State. As Jordan is considered as a moderate country in the Middle East region with strong ties with the West, international companies and NGOs might also consider it as a gate through which they can penetrate the regional markets. Therefore, after establishing roots

in Jordan they might expand to other more conservative countries in the region. For instance, World Links subsequently extended its mission to include Syria, Yemen and Palestine through its office in Jordan.

Clearly, drawing upon international best practices and experiences can enrich the Jordanian educational system's integration of ICT. However, as indicated earlier, the current study revealed fragmentation and competitiveness in the efforts to involve externally created ICT training courses (Sami and Sahar), which was exacerbated in two ways:

1) The heavy reliance of the educational system on these programmes which did not have clearly defined national standards for ICT professional development as a whole for the context of Jordan. Rather, the ministry relied on each programme to develop its own standards.

2) There was no careful selection from the various training programmes offered as the educational system welcomed all ICT training courses as long as they comply with general guidelines (Omar).

8.3.4 Coordinating Efforts

As noted earlier, the absence of defined standards and objectives resulted in an unsystematic selection of ICT training courses, especially if we consider that all major training courses were internationally developed ones. During the present study it became evident that there was competitiveness, rather than cooperation, among the several training courses. Teachers, mentors and other stakeholders pointed out that the lack of coordination between these courses resulted in more pressure on teachers and compromised the outcomes of these courses (Sahar, Sami, and Ali).

The absence of clear objective for ICT integration may result in unjustified selection of certain courses. The diversity of courses should serve in enriching the experiences of teachers and ultimately the overall integration of ICT. Therefore, adopting particular courses should be aligned with well-defined goals and standards. For instance, the

Ministry considered Intel and World Links as similar so teachers were not allowed to combine the two courses. However, according to Sami, they were *very different*.

As noted earlier in Chapter 3 (section 2.3), the planning of the implementation stage is vital to ICT integration. When various stakeholders and external partners are involved in the implementation of national projects it becomes paramount to coordinate such their involvement. Such coordination might play a major role in maintaining the wholeness of ICT integration projects and it might save them from being fragmented due to the wide range of partners involved.

There are two forms of coordination which are required in order to achieve optimum outcomes for ICT integration projects in Jordan:

-       Coordinating the objectives of each training course in order to be aligned with, and not repetitive of, other courses; and

-       Minimising competition between course providers and ensuring that all courses focus on achieving certain objectives that serve the overall objectives of ICT integration.

8.3.5 Top-down

As indicated earlier, the educational system of Jordan is highly centralised. All regulations, mandates, and interventions originated in the Ministry of Education before they are diffused across the system through the regional directorates of education. In this context, the ERfKE project further illustrated this mechanism of decision-making. Chapter 7 (Section 1.2) illustrated the superficial participation of teachers in ERfKE, as Leila, and another male teacher were the only teachers to attend preparation meetings for ERfKE and Leila was *speaking as the representative of teachers* (Leila, December 7, 2005).

According to Rogers (2003), the diffusion of innovations in centralised systems tend to spread vertically while in decentralised systems the diffusion spreads horizontally. The two systems also differ in the participation of players across the system, as the decentralised system is characterised by greater knowledge sharing between participants

and by flexibility to re-invent and evaluate the innovation. Moreover, diffusion of innovations in centralised systems is controlled by national government administrators and experts, while in decentralised systems more control is given to schools and teachers to share and re-invent (see Chapter 3, section 2.4).

Clearly, the process in which an intervention is disseminated across centralised systems may affect the essence of the intervention. As the decision seeps from the upper level, it has to go through several levels of the bureaucratic system before it reaches classrooms. furthermore, the implementation might be lengthy and the core of the initiative might be modified. During this process, attitudes, experiences, resources and knowledge at each level of the educational system might modify the core of the intervention. This was evident when one principal refused to accept new computers at her school in order to avoid being responsible for them (Maram), which would certainly limit teachers' and students' access as a consequence of her decision. Furthermore, the lack of enthusiasm for ICT integration among some directors in the regional directorates (Hassan, Samir, and Khalid) can certainly have impact on ICT integration within their directorates and the overall attitudes towards ICT.

Moreover, excessive structure in implementing educational reforms may leave the system in 'gridlock' (Fullan, 1999). Therefore, schools' total dependence on the centre of the educational system without having a level of autonomy might exacerbate the complexity of ICT integration. In Chapter 6, Al Fajr School illustrated an unusual sign of autonomy as the school organised a training course for its teachers once the principal, Hiba, realised that it was needed. Therefore, this was a timely intervention which targeted particular needs of particular users of ICT. In this way, the school benefited from the knowledge and expertise of the computer lab coordinator who was the instructor in the course. This might support Ely's (1999) claim that the closer the leadership to the user, the better for implementing new innovations. At the same time, providing too little structure, by giving schools complete autonomy, can also create chaos by giving the system only minimal influence over educational standards (Fullan, 1999; Fullan, 2000a).

Teachers in top-down reforms

Moreover, the top-down mechanism of educational reform also contradicts the increasing awareness that teachers are the main change agents of any educational interventions. In the top-down reform, teachers are passively involved as they become at the receiving end of reform. But teachers may become more involved in ICT integration if they can decide on the time and content of their training (Sarbib, 2002) and when they become actively involved in the decision for ICT integration.

Top-down regulations at best, can create some necessary but not sufficient conditions which might attract interested teachers and curious students (Tyack *et al.*, 1995). However, outcomes which really matter for educational change, such as the development of skills, creative thinking and committed action, cannot be mandated, because they are simply too complex (Fullan, 1993). Tyack and Cuban (1995) argue that "educational excellence cannot be coerced" and that regulations and mandates can "compel responses but the results may be compliance of a kind that actually dampens excellence" (p.80). Apparently, things that can be mandated effectively "(i) do not require thinking or skills in order to implement them; and (ii) can be monitored through close and constant surveillance" (ibid, p.22). however, this is not the case in dealing with reforms that involve teachers who are the primary agents of school change (Gillingham *et al.*, 1999; Sarbib, 2002). Although teachers have little choice over whether or not to use ICT, they retain a great deal of the more fundamental role of deciding how and when to use them in the classroom (Somekh *et al.*, 1997).

A major concern in top-down reform is that schools' and teachers' practices can absorb such changes and buffer them through appearing to undertake changes on the surface while changing little at the core. Teachers can twist such changes and weave some new elements into their old practices, which is a typical response from institutions to large-scale educational reforms as they make changes in their surface structures while at the same time changing little at their core (Elmore, 1996). Therefore, external changes seemed at best to affect teachers' use of materials but would not result in changes in practices or beliefs (Fullan, 2000a).

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8.3.6 From Planning to Implementation: The Un-guaranteed

As indicated earlier in Chapter 2 (section 2.5), the ERfKE project combined four components of which Component 2 aimed to *transform education programmes and practices to achieve learning outcomes relevant to the knowledge economy* (Ministry of Education, 2004). This component had three main sub-components:

- prepare curriculum and assessments for the knowledge economy;
- provide professional development for Ministry of Education personnel;
- provide required resources to support effective learning.

The project shows sound and comprehensive planning for developing all aspects of the Jordanian educational system that contribute to preparing students for the knowledge economy. In addition, the educational system successfully generated massive international support for the project in the World Economic Forum held in Jordan between 21-23 June, 2003. Therefore, ICT integration was remarkably accelerated across the educational system through financial and expertise assistance.

However, the present study has highlighted a clear gap between planning for the project and its implementation. Chapter 6 and Chapter 7 identified several issues that contributed to hindering or facilitating ICT integration at the three levels of the Jordanian educational system. In earlier studies, the mismatch between planning and implementation was identified as a major threat to educational interventions. Fullan and Stiegelbauer (1996) stressed that the failure of educational change to achieve its objectives may be related just as much to the fact that it was never implemented in practice. Furthermore, Fullan (2000a) argued that the successes of change after 3, 5, or 8 years can be misleading, that is they may remain not institutionalised and they can be "easily undone by a change in leadership or direction" (p.20). Changing leadership of Al Noor School resulted in a drastic decrease in ICT utilisation in the school.

Kozma (1991) was more precise in talking about the particular features of instructional media, warning that no matter how powerful the medium is and what features it has, all the features become useless if they are not used. For example, as noted earlier, the

powerful communication functionality of ICT meant nothing for teachers who did not use it (Samar, and Leila).

As discussed earlier in Chapter 7 (section 2.3), Sami and Salem pointed out that although the Ministry spent a great deal of resources and effort on developing the *"I Love Physics"* CD, it was not used by the vast majority of teachers. In addition, the computers in the labs at Al Noor School were covered with dust because they had not been used as the lab coordinator position was vacant after Nedal had left the school (Jameel). Moreover, it is widely believed that ICT can scaffold learning and teaching as well as providing interactivity through local and global communities for teachers and students (Kozma, 2003). However, due to connection problems in schools, teachers and students were unable to benefit from e-contents online. Instead, as much as a third of Jameel's and Reem's lessons were wasted due to technical problems.

Moreover, while it is inevitable, and desirable, for the Jordanian education system to draw on international experience and best practice in its ICT integration, it is also imperative to do this with cautiousness. Experiences generated in educational contexts are culturally and contextually sensitive, and ignoring such factors can result in failure (Dimmock, 2000). The uniqueness of each educational system makes its experiences and possibilities also unique, and the term 'best practice' should be strictly limited to the context where it was generated. This perception might also draw into question the procedure of diffusing ERfKE through the Discovery Schools initiative. As previously noted, the Discovery Schools were mainly located in the vicinity of the Ministry of Education, the regional directorates of education's offices, and Queen Rania Centre, which provided exceptional advantages for these schools. Therefore, the procedure of rolling out experiences and practices from these schools to other schools countrywide should not expect similar results. For example, Chapter 5 (section 2.2) showed that while the ratio of students to computers in Al Fajr School/girls from the Central region was 10.78/1, this ratio was 21.5/1 in Al Seel School/boys from the Southern region. In addition, while all schools in the Central region had at least 20 computers connected to the Internet and/or intranet, there was only one school with 6 connected computers from the Southern region.

8.3.7 Capacity Building

It has been illustrated that the Jordanian educational system relies heavily on external aid in undertaking major educational reforms. However, it might be impossible to maintain the flow of resources without disruptions over a long period of time. Therefore, the focus should be on building capacity within the system. It is crucial for the effectiveness of any reform project involving external aid agencies to dedicate sizeable efforts for building capacity in order to be able to carry on in case this aid ceases or disrupted.

While building capacity was addressed in the initial planning for the ERfKE project, the implementation was not within the scope of the Ministry of Education either in terms of quality and quantity. The educational system was overwhelmed with various pressures, and the focus was diverted from a holistic approach towards reform to more fragmented and isolated achievements. As indicated earlier, this was clear, for example, in the diversion of efforts from mentoring to training and authoring as well as the attempt being made to strike balance between the local situation and the demands of external aid partners. This gap might be the result of ignoring two important variables identified for the success of such reform policies (Johnson, 2000):

    (i)   the content of the educational policy which is defined by its substantive components and its rationales; and

    (ii)   the institutional context of the policy in which it is implemented.

While creating pedagogical materials and improving teachers' knowledge and skills are crucial for ICT integration, such dimensions of the educational reform should be considered in light of the larger contexts of schools and the educational system. Otherwise, educational reform might result in isolated or short-lived achievements. Furthermore, capacity building should also consider all levels of the educational system as performance at one level can certainly affect the performance at other levels. Overall, building capacity across educational systems can take two forms, as it is seen in Table 8.1 below.

Capacity Building	
Classroom-Level	Organisational-Level
- Teachers' knowledge, skills and dispositions - Students' motivation and readiness to learn - Curriculum material for students and teachers	- Number and kinds of people supporting the classroom - Number and quality of social relationships - Material (non-human resources) - Organisation and allocation of school and district resources

Table 8. 1:   Capacity building at two levels of the educational system. (The table is based on Massell's (1998) discussion of the elements of capacity building pp. 5-14)

Therefore, effective capacity-building should consider comprehensive strategies that involves all aspects of the educational that can have impact on the implementation of educational changes.

8.4   Summary

Chapter 8 has presented discussion of a variety of aspects and issues across the Jordanian educational system that appeared to have an impact on ICT integration. Schools', directorates' and Ministry's issues have been discussed in relation to planning, decision-making, and implementation of ICT integration. The discussion also linked the roles and practices of each of the three levels of the educational system in the overall integration of ICT.

ICT integration at the school level seems to have been influenced by three main issues: school leadership, school ICT-readiness, and teacher issues. These issues appear to have direct impact on schools' adoption of ICT. At the directorate of education level, this chapter revealed that ICT professional development, follow-up and ongoing support, as well as maintenance and technical support were the major issues associated with this

level of the educational system. The Ministry level dealt with issues related to making the decision, managing the system's relations with external partners, and the mechanism of implementing educational reforms across the system.

In the concluding chapter which follows, I will, among other things, integrate and explore some of the major and interesting findings that emerged as a result of this study and which have been discussed throughout this chapter.

Chapter 9

Summary and Conclusions

It had been impressive to watch workers engaged in planting trees along the road to Irbid, which had triggered pictures of the foreseeable future of a beautiful road lined with trees. The project of beautifying the road to Irbid itself was admirable and could be readily supported by anybody using the road. However, after many years of planting, with the same workers doing the same job as they grew older, a few *patches* of green colour had become attached to the landscape. This stimulated a two-sided contemplation. The first was prompted by the few patches of trees, which was an unmistakable proof that the land is not barren. Those were some signs of fertility, which clearly indicated that beautifying the scenery is thus indeed possible. On the other hand, it also triggered questions about the value of the project's outcomes compared to the cost and time invested. Clearly, the scarcity of water after plantation was a major cause of losing the newly planted trees. This is a highly predictable ending when trees are planted in a hot and dry climate without proper effort following the planting in order to assist root development and trees' survival.

The scarcity of resources in Jordan reinforces the importance of strategies and priorities in undertaking development projects. Prioritising the *sustainability* of a project can result in a more successful approach to development which focuses attention on what is lasting and thorough.

9.1 Review of the Research Aim

I entered this research with a general intent to explore ICT adoption by Jordanian schools and teachers' utilisation of it in teaching and learning. Over time, after reviewing the literature and engaging in fieldwork, this idea evolved into a broader issue involving the three levels of the educational system: schools, regional directorates, and the Ministry, together with their roles and influence on ICT practices in classrooms. Soon it became

clear that classroom practices and teachers' adoption of ICT are bonded to decisions made at all other levels of the educational system. Therefore, the initial intent to study teachers' and schools' adoption of ICT led me to investigate the influence of these layers of the system on the ultimate adoption of ICT in classrooms.

Here I recapitulate the main issues raised throughout the previous chapters, including:

- Sustainability of ICT integration
- Development and continuing development
- Reform strategies
- Capacity building strategies.

9.1.1 Sustainability of ICT integration

A successful ICT integration is necessarily one that is sustainable. One of the defining features of ICT integration in education is its significant recurrent spending. It is plausible for the Jordanian educational system with its scarce resources to seek external financial and expert assistance in order to initiate large-scale educational reform. However, for sustainable ICT integration, effort and spending should be secured along all stages of ICT integration - decision-making, adoption, implementation, and institutionalization - as even early signs of achievements can be misleading if they are not maintained.

The educational system's decision to integrate ICT across the system was necessary and effective in creating a political and public positive climate for integration. The decision also generated remarkable support from international partners and secured resources for the launch of ERfKE and the JEI. However, sustainability of resources and effort during all stages of integration is crucial for achieving desired outcomes. While providing schools with a reasonable number of computers is necessary, the computers can become worthless if they are not used due to non-functionality or the lack of proper technical support and maintenance. Similarly, providing schools with Internet connection is a prerequisite for school members to access e-content. However, this powerful technology might become a burden if the connection is insufficient to provide access to this content

due to slow connection or technical problems. In addition, constant professional development is needed for teachers to stay abreast of the changes around them, and this is especially the case with the swiftly-developing field of ICT.

In order to avoid misleading early signs of success, ICT integration requires development and additional efforts beyond the initial investment. Therefore, teachers' and schools' adoption of ICT must be underpinned by ensuring sustainable and adequate access to e-content, follow-up, professional development, adequate infrastructure, technical support and maintenance. The long-term success of ICT integration is also reliant on the flow of resources during all stages of implementation. However, reliance on external sources - aid agencies, NGOs, and the private sector - in ICT integration may well compromise its sustainability, as the local educational system may not have complete control over the flow of resources over an extended period of time.

9.1.2   Development and continuing development

I have argued (Chapter 1 and Chapter 2) that the complexity of ICT integration across the Jordanian educational system stems from three factors: the complexity of ICT integration in educational settings *per se*; Jordan's geo-political location in the heart of the Middle East; and its economic status, which makes Jordan reliant upon assistance and aid from external sources in order to undertake reform projects.

As indicated earlier, the Jordanian educational system sought financial and expertise assistance for ERfKE and the JEI in two main ways:

         a)   Assistance from aid countries and international agencies; and

         b)   Building partnerships with the private sector, both local and international.

While drawing upon these resources maybe inevitable in order to implement large-scale educational reforms in Jordan, as well as other developing countries, they might be approached in a more careful way.

a) Assistance from aid countries and international agencies

Involving external partners can enrich national reforms through financial and expert assistance. However, this study revealed that the involvement of external partners can cause delay, derailment and imbalance within ICT integration when there are no clear national strategies for the implementation stage of the integration. Therefore, the involvement of these external parties might be more effective when they are part of a clear national educational strategy which is aligned with larger national agendas. Such agendas might safeguard ICT integration from being fragmented due to the involvement of various key players, and can also prevent ICT implementation from being skewed by the objectives and interests of various parties involved.

It is the responsibility of the national educational system to ensure that the various key players are working to achieve certain objectives and that they operate according to clear national standards. This might also ensure balance within ICT integration *per se* by maintaining a similar pace of progress in all streams of the project. Furthermore, the success of ICT integration is highly reliant on its holistic nature involving professional development, infrastructure, contents, follow-up, maintenance and ongoing support. Accordingly, achieving success in one of these streams does not compensate for the under-development of others.

b) Partnership with the private sector

Public education can benefit greatly from the capacity and expertise of the private sector. As specialised businesses enterprises, both local and international private sectors can provide public education with expertise and financial assistance in order to facilitate and accelerate ICT integration. For instance, the current study has shown how the involvement of the private sector in ERfKE helped greatly in accelerating the development of e-content, in-classroom technology deployment and teacher training. However, it also became clear that the involvement of the private sector can cause disruptions due to disagreements and disputes. And so, partnership with the private sector should to be approached with caution. It might be a more fruitful approach to ensure that the national education system has control over the agendas and practices of

the private partners who are involved in such projects. This requires developing a clear strategy and vision which attend to standards, outcomes and accountability at all stages of ICT integration.

The fragile nature of the educational context necessitates extra caution when building public-private partnerships. That is, profitable companies, or their affiliates, might be eager to provide support and resources to particular sectors in education in order to generate returns in the short or long term. For instance, Cisco systems was keen to support a reform project, or a part of it, which involves the integration of ICT, which might guarantee its access to the education market in Jordan and eventually other countries in the Middle East region. However, the eagerness of profit-driven companies might collapse if they are approached to support projects, or components of projects, that do not fall into their business categories, such as asking them to supplement teachers' salaries. In large-scale educational reforms, such as ERfKE, this might cause imbalance by supporting and accelerating certain components of the project while others remain lagging behind because they do not match the interests of external partners, an outcome which might leave the whole project in disarray. Therefore, a balance has to be struck between the agendas of the education system and those of the private sector, both local and foreign partners.

Conceivably, the involvement of external partners, both private sector and aid partners, might be sought during the planning and implementation of ICT integration in order to keep such partners interested in the project. However, the local educational system's cautiousness of the various interests of the involved parties might result in drawing unrealistic deadlines or even manipulating project achievements. In the present study, it sometimes led to producing inaccurate reports about project achievements during the implementation stage or magnifying signs of success which can be easily recognised by aid partners.

9.1.3 Reform Strategies and ICT integration

It became evident that ICT integration is enabled/limited by broader issues associated with educational reform itself. The current study highlighted three main issues regarding reform strategies across the Jordanian educational system: a top-down reform approach, the role of the regional directorates, and ensuring full implementation of ICT. The three issues are discussed next.

a) *Top-down approach*

It became evident that a top-down reform approach in educational intervention can have impact on the quality and effectiveness of ICT integration. It was also clear that each level of the educational system - schools, regional directorates, and the Ministry of Education - had direct impact on ICT implementation and utilisation in classrooms. A central belief evolved during this study that a full integration of ICT could not be achieved in schools unless related issues are resolved at other levels of the education system.

Teachers and schools can respond to top-down direction in sophisticated ways. When schools and teachers are pressed to undertake *others'* reforms that are mandated by an upper educational authority without being consulted or prepared, they can respond by simulating such reforms. This usually happens through changing the structure for outsiders while shielding the core of their practices and keeping them intact. The evidence of this project confirms earlier studies warning against the top-down approach for ICT integration and suggesting bottom-up reform together with top-down support. The bottom-up approach in the diffusion of ICT across the educational system can perhaps achieve more fundamental outcomes as it engages teachers and schools in the integration and it might additionally make them feel more accountable. And this process can generate a sense of ownership among teachers instead of having a feeling of passive involvement in the integration.

b) *The role of the regional directorates of education*

In their role as the intermediate part of the educational system, the regional directorates of education represent a linkage between the Ministry of Education on one hand and schools and teachers on the other. It was clear throughout this study that teachers' adoption of ICT was directly influenced by the performance and support of the regional directorates, as it is the directorates' responsibility to equip schools with ICT, conduct ICT professional development, provide follow-up, and supply technical support and maintenance.

It became clear that the regional directorates are bonded to the large body of the educational system and they implement the Ministry's projects and initiatives. However, this can have a negative impact on the actual implementation of reform as it is disseminated across the educational system through its several layers. Lengthening the process between planning and implementation, as happened in this study, can result in fundamental modification to the original version of an educational intervention. And this is not an expected feature of centralised systems, where all parts are tightly attached to the centre, and where little or no autonomy is left to implementers of reform.

Giving a degree of autonomy to the regional directorates might make their services more efficient and more receptive to teachers' and schools' needs. As noted earlier, mentors, as the part of the regional directorates that maintains direct contact with schools and teachers, can determine teachers' levels of ICT adoption, and they might be in the best position to make timely intervention and decisions that target individual teachers' needs. Mentors can, for example, design or assign professional development courses for teachers according to their individual needs and their levels of competence in using ICT instead of relying on one-size-fits-all approach adopted by the top-down strategy. However, when mentors are extremely overloaded their role in ICT integration might be diminished and confined to superficial visits which are unable to provide proper support follow-up.

Moreover, subject mentors can play an effective role in linking teachers in two different ways: bringing together teachers of the same subject within one school, and bringing

together teachers of the same subject from different schools. Usually, when a new idea is adopted or invented by teachers of a particular subject in one school, there arises a need for cross-fertilising this idea with other groups in the same school as well as with other groups in other schools. These innovative ideas can be adopted more easily by other teachers as they emerge from their context and they are trialed by colleagues, especially in the case of ideas introduced by early adopters in schools. Mentors might also create clusters of schools in which experiences, ideas, training and technical support are exchanged and shared. For instance, mentors can link history teachers using ICT together in a particular school and can do the same with history teachers in other schools in the same district, which serves to harmonise the integration of ICT across schools and among teachers. This might also create communities of practices for teachers to share their experiences and to reflect upon their own practices while they exchange their experiences with their colleagues who teach the same subject especially when they use ICT. The directorates of education can play this *networking* role in order to facilitate the flow of educational practices from one school to another in a given district, and might create thereby *pools* of ICT adoption instead of isolated practices undertaken by individuals.

c)   Ensuring full Implementation of ICT

The literature is full of accounts of projects which were initiated but never fully implemented and therefore could not meet their objectives. It became evident that ICT integration should take into account four key factors: holistic approach, bureaucracy, follow-up, and the human factors involved with ICT integration.

ICT integration can be more effective when it follows a holistic approach by taking into account all issues at each level of the education system that contribute to facilitating or hindering ICT utilisation in classrooms. For example, developing new materials and curricula should not be at the cost of follow-up for teachers. A holistic approach for ICT integration would also include a clear vision for, integration, with defined, clear goals and standards for all stages of the integration.

The bureaucratic nature of the educational system makes it vital for all levels of the educational system to work efficiently together in order to achieve effective implementation. Each level of the system has a role and responsibility during implementation which can hinder or facilitate the overall integration across the system.

Follow-up is an integral part of ICT implementation. Follow-up can support the actual utilisation of ICT in schools as well as help teachers in implementing their newly developed skills through. In addition, follow-up might help in easing the tension between the long-established traditions of classrooms and the new practices offered by ICT integration.

Furthermore, providing more resources to improve teaching conditions, especially training and welfare of teachers, may need to underpin ICT integration. This study revealed that teachers' resistance or their slow adoption of ICT was not due to skepticism of its potential value for their profession. Rather it was a reaction against the context in which ICT was integrated, and a dissatisfaction with the professional conditions of teachers beyond such projects. Therefore, improving teachers' working conditions might reflect positively on their opinions towards adopting ICT.

9.1.4 Capacity Building Strategies

Considering the significant dependence of the Jordanian educational system on external sources for educational reforms, it is difficult to maintain or control the flow of resources without disruptions. Therefore, reforms should dedicate effort and resources to building capacity within the system in order to sustain achievements of the reform. Narrow or ad hoc educational interventions might produce materials or improve knowledge and skills which are integral ingredients in educational change, but these developments should be considered in the larger context of schools and the whole educational system. Otherwise, this might result in isolated improvements or short-lived achievements.

While the capacity-building issue was addressed in the initial planning for the ERfKE, it was undermined by the limited capacity of the educational system during project

implementation. Accordingly, and in order to respond to the internal (within the system) and external (beyond the system including lenders and deadlines) pressures, the educational system was overwhelmed and the focus was diverted from a holistic approach to more fragmented and isolated achievements. It became clear that the Jordanian educational system found it difficult to implement large-scale reform in a range of areas over time.

9.2 Implications of the Study

While the study started with a focus on ICT in schools, in fact it may be seen to have implications for any educational interventions implemented with a system. Overall, planning and implementation of educational interventions usually rely on similar strategies which are shaped by the hierarchy of the educational system and the mechanism of disseminating policy statements across the system following top-down approaches.

Moreover, although the Jordanian context is unique, some of the major issues identified in the current study are issues shared with other countries in the region and with developing countries in many parts of the world, particularly with countries from the MENA region. The common features include poverty and the limited capacity of educational systems in such countries to undertake costly or large-scale educational interventions alone. Consequently, educational systems in these countries seek financial assistance and support from external aid in order to undertake development reforms.

9.3 Future Directions for Research

I believe the way forward is to continue to explore the wholeness of the educational system as it attempts to integrate ICT. Further investigation and research needs to explore ways in which Jordan, as well as other developing countries, can undertake sustainable ICT integration while they rely on aid from external sources. This study has illustrated some of the difficulties inherent in achieving ICT integration across the Jordanian educational system while relying on external sources for funding and assistance.

It is premature at this stage to determine the extent to which ERfKE will transform the Jordanian educational system. This study was conducted in parallel to the implementation of the first phase of the ERfKE project which was scheduled to be completed by 2008, after which a second phase will continue. While this study examined the actual implementation of ICT integration across the system, further studies may investigate the impact of ERfKE after the completion of phase one and at later stages.

I also believe that a longitudinal study that stays abreast of ERfKE during its two phases would provide a valuable account of the implementation stage. Such study can document success and downsides during the implementation of the reform, as the current study was a slice of the project which focused on ICT integration and was limited by time and resources.

I am with the belief that the debate has moved away from "whether" to "how" ICT can enhance teaching and learning in a given learning context. A fundamental part of this argument is that ICT integration must consider a wide range of factors across the educational system in order to be successful. This study has explored several factors at each of the three levels of the Jordanian educational system including schools, regional directorates, and the Ministry of Education. It would be worthwhile to conduct an in-depth investigation of these factors on a larger-scale, which would include schools from more diverse locations as the initiative expands nationwide. Furthermore, it will be useful conduct studies in order to provide insights on students' utilisation of ICT in Jordanian schools.

APPENDIX A: Teacher Questionnaire

UNIVERSITY OF TECHNOLOGY SYDNEY

SURVEY

ICT INTEGRATION WITHIN THE JORDANIAN EDUCATIONAL SYSTEM

This questionnaire for teachers who have undertaken any information and communication technology (ICT) professional development programmes. The questionnaire contains questions and statements about the effectiveness of those programmes. Place a tick [✓] in the square next to the appropriate answer or fill in the answer.

1. Gender :   [ ] Male   [ ] Female

2. Age: [ ] 25 and less   [ ] 26-30   [ ] 31-40   [ ] 41-50   [ ] over 50

3. Subject specialisation: (e.g. Maths) _____

4. School: _____

5. Directorate of Education: _____

6. Experience in teaching: _____ years

7. Which ICT programmes have you undertaken? (*Choose one* OR MORE WHENAPPLICABLE)
[ ] ICDL   [ ] World Links   [ ] iEARN
[ ] Intel Teach to the Future   [ ] Other, name: _____

8. Where did the training take place? (*Choose one* OR MORE WHENAPPLICABLE)
[ ] Classroom   [ ] Lecture room
[ ] Computer lab   [ ] Others

9. Do you think the place where the training took place reflected positively or negatively upon your ability to transfer the new skills to the classroom?

_____
_____
_____

10. what was the main focus of the training: (*Choose one* OR MORE WHENAPPLICABLE)
[ ] Skills in using computers only
[ ] Personal use of computers (*e.g. preparing lessons, students records*)
[ ] Practical training on using ICT in teaching your subject
[ ] Other: _____

11. Do you think the time given to training is enough to
develop new skills which can transform instruction?   [ ]   YES   [ ]   NO

(Go to page 2)

12. Did the training consider your previous knowledge and use of ICT?

[ ] Yes   [ ] No

13. What sort of skills have you developed from the training?

[ ] Computer skills   [ ] Pedagogical skills

[ ] No skills   [ ] Other: _____

14. What other skills do you think you need and how they can affect your instruction?

_____

_____

_____

15. Do you still use the skills you developed during your   [ ] YES   [ ] NO
training?   *(if the answer is NO please go to Q.17)*

16. Which skills do you still use regularly?

[ ] Lesson preparation   [ ] Searching for additional resources

[ ] communication   [ ] Uploading some lessons on the web to be available
                                      for students any time

[ ] Other: _____

17. What do you think you need more to link the acquired skills with the context of the classroom and how you imagine that can enhance your teaching?

_____

_____

_____

18. Is the current curriculum restrictive for your integration of ICT
in your teaching?   [ ] YES   [ ] NO

19. What motives or incentives did you receive for your training? *(Choose one OR MORE WHENAPPLICABLE)*

[ ] Accreditation (*certificate name:* _____)   [ ] Teacher ranks

[ ] Money rewards   [ ] None   [ ] Other: _____

20. Is your school administration supportive to teachers' ICT training?

[ ] YES   [ ] NO

21. Did you receive any follow-up after the training?

[ ] YES   [ ] NO   *(If the answer is NO, please go to Q.23)*

22. Was that follow-up enough to help you in transferring the new
skills into the classroom setting?   [ ] YES   [ ] NO

(Go to page 3)

23. How can your interaction with other teachers who use ICT into their instruction help you in your own practice? (*choose one or more*):
- [ ] I can reflect upon my own use of ICT
- [ ] Learning new ways of using ICT in my instruction
- [ ] It can help in solving the daily problems while using ICT in the classroom
- [ ] Other:_____

25. AS A RESULT OF MY TRAINING:

My relationship with other teachers is more collaborative   [ ] YES [ ] NO

I am more aware of the benefits of ICT for me as a teacher   [ ] YES [ ] NO

I use ICT in teaching my teaching subject   [ ] YES [ ] NO

I am confident when I use ICT in the classroom   [ ] YES [ ] NO

My teaching has improved   [ ] YES [ ] NO

My instruction is more student-centred   [ ] YES [ ] NO

26. Please add any comments on your ICT professional development and how it can be improved to enhance teachers' performance in the classroom.

_____

_____

_____

_____

THANK YOU FOR YOUR COOPERATION BY COMPLETING
THIS QUESTIONNAIRE

APPENDIX B: Principal Questionnaire

UNIVERSITY OF TECHNOLOGY SYDNEY SURVEY

ICT INTEGRATION WITHIN THE JORDANIAN EDUCATION SYSTEM

This questionnaire is about the information and communication technology (ICT) programmes and their effectiveness for teachers at your school. Tick in [✓] next to the appropriate answer for the following questions, or fill in the answer.

1. Gender : [ ] Male [ ] Female

2. Age: [ ] 25-30 [ ] 31-40 [ ] 41-50 [ ] 50-60 [ ] Over 60

3. Experience in administration: _____ years.

4. Experience in teaching: _____ years.

5. School: _____

6. Directorate of Education: _____

7. How many students in your school? _____ students.

8. How many teachers? _____ teachers.

9. How many computers? _____ computers.

10. How many computers are connected to the internet? _____ computers.

11. Where are the computers located?
[ ] Computer lab [ ] Classrooms [ ] Computer lab and classrooms [ ] None

12. Who chooses teachers to undertake certain professional development programmes?
[ ] The administration [ ] The regional Directorate of Education
[ ] The teacher [ ] Others

13. Who recommends educational software for your school to buy or to order from the Ministry of Education?
[ ] Teachers [ ] The administration [ ] The Ministry of Education [ ] Others _____

14. Have you done any ICT professional development? [ ] YES [ ] NO

Please go to page 2…

UNIVERSITY OF TECHNOLOGY SYDNEY

15. Regarding ICT integration in the school:

I can help teachers to overcome some pedagogical

problems during their implementation of ICT   [ ] YES [ ] NO

We have enough computers in our school for teachers   [ ] YES [ ] NO

We have enough computers in our school for students   [ ] YES [ ] NO

I am aware of the Ministry of Education's plans for educational

reform   [ ] YES [ ] NO

The current ICT training for teachers reflects positively on teachers'

instruction   [ ] YES [ ] NO

I use the internet regularly   [ ] YES [ ] NO

I contact teachers via emails   [ ] YES [ ] NO

I contact parents via emails   [ ] YES [ ] NO

Teachers who have undertaken ICT training are confident when they

use ICT in their instruction   [ ] YES [ ] NO

I facilitate teachers' interaction within their community as teachers   [ ] YES [ ] NO

Teachers who have undertaken ICT training are confident in using

ICT in their teaching   [ ] YES [ ] NO

ICT is easily accessible for teachers at the school when needed   [ ] YES [ ] NO

We have a permanent technician at the school   [ ] YES [ ] NO

Teachers who have undertaken ICT training are more collaborative

than others   [ ] YES [ ] NO

I prefer when the training is carried out at the school level   [ ] YES [ ] NO

We have enough resources and expertise to design ICT

professional development at the school level   [ ] YES [ ] NO

Teacher training has reflected positively upon students' achievement   [ ] YES [ ] NO

16. Please add any comments on ICT professional development programmes for teachers and how those programmes can be improved to enhance teachers' performance in your school.

THANK YOU FOR YOUR COOPERATION BY COMPLETING
THIS QUESTIONNAIRE

APPENDIX C: Information Sheet

Information Sheet
The Choice of ICT Integration as a Mechanism for Educational Reform within Jordanian Schools
UTS approval number: 2005-87A

WHO IS DOING THE RESEARCH?

My name is Atef AbuHmaid and I am a student at UTS. (My supervisor is Dr Debra Hayes)

WHAT IS THIS RESEARCH ABOUT?

The research is to investigate the current information and communication technology (ICT) integration in Jordanian schooling. It will be an investigation of the choice of ICT as a mechanism of reform for the knowledge economy. The outcomes of the research will be available for the Ministry of Education so it will help in planning for ICT integration in the future and in implementing other educational reforms. Consequently, the whole education system can benefit through better planning, management, and spending on educational reforms.

IF I SAY YES, WHAT WILL IT INVOLVE?

If you are participating in the questionnaires, I will ask you to complete the attached questionnaire in your free time and get it ready to be collected by the researcher afterward. If you are participating in the observations and/or interviews, I will interview you or/and observe you while you work.

ARE THERE ANY RISKS?

There are very few if any risks because the research has been carefully designed. However, it is possible that you feel embarrassed to be observed.

WHY HAVE I BEEN ASKED?

You are able to give me the information I need to find out about the current ICT integration in Jordanian schoolings which can shed the light on the choice of adopting ICT as a mechanism of reform within the Ministry of Education. Officials, principals, and teacher can provide worthwhile perspectives about ICT integration in Jordanian schooling. Thus, the outcomes of this study can be available for the Ministry of Education for a better planning for the future integration of ICT in Jordanian schooling which may reflect positively on teachers' participation and the school context.

DO I HAVE TO SAY YES?

You don't have to say yes.

WHAT WILL HAPPEN IF I SAY NO?

Nothing. I will thank you for your time so far and won't contact you about this research again.

IF I SAY YES, CAN I CHANGE MY MIND LATER?

You can change your mind at any time and you don't have to say why. I will thank you for your time so far and won't contact you about this research again.

WHAT IF I HAVE CONCERNS OR A COMPLAINT?

If you have concerns about the research that you think I or my supervisor can help you with, please feel free to contact me on 7959 39869; or email atef.abuhmaid@student.uts.edu.au or my supervisor debra.hayes@uts.edu.au .

If you would like to talk to someone who is not connected with the research, you may contact the Research Ethics Officer on (+61) 02 9514 9615, and quote this number: 2005-87A. or my local contact Mr Ayman Alnemrawi (lawyer) (Mobile:).

Thank you for your co-operation

APPENDIX D: Consent Letter

UNIVERSITY OF TECHNOLOGY SYDNEY

Atef Abuhmaid

Mobil:

ICT Integration in Education

CONSENT LETTER

My Name: _____

Position: _____

I agree to participate in the research project *ICT Integration as a Mechanism for Educational Reform in Jordan: Crisis, Choice, Context, and Costs* being conducted by Atef Abuhmaid, from the Faculty of Education, of the University of Technology, Sydney. I have read and understand the information about the research, and any questions I had about the research have been answered clearly.
I agree that the information gathered in this survey may be published in a form that does not identify me in any way.

_____ ____/____/_____
Signature   Date

NOTE:
This study has been approved by the University of Technology, Sydney Human Research Ethics Committee and an approval was obtained from the Ministry of Education to conduct it in Jordanian schools. If you have any complaints or reservations about any aspect of your participation in this research you may contact the Ethics Committee through the Research Ethics Manager, Ms Susanna Davis (ph: +61-2-9514 1279) or my local contact the lawyer Ayman Alnemrawi (lawyer) (Mobile:). Any complaints you make will be treated in confidence and investigated fully and you will be informed of the outcome.

APPENDIX E: The Ministry of Education's Approval

بسم الله الرحمن الرحيم

وزارة التربيــة والتعليــم

<table>
<tr><td>الرقم</td><td>١٠ / ٢</td><td>التاريخ</td><td>١٤٢٠/٩/٢٨</td><td>الموافق</td><td>٢٠١٠/١٠/٢١ ح</td></tr>
</table>

السيد مدير إدارة المناهج والكتب المدرسية

السيد مدير التربية والتعليم لمنطقة عمان الأولى

السيد مدير التربية والتعليم لمنطقة عمان الثانية

السيد مدير التربية والتعليم لمنطقة إربد الأولى

السيد مدير التربية والتعليم لمنطقة إربد الثانية

السيد مدير التربية والتعليم لمنطقة الكرك

الموضوع : البحث التربوي

السلام عليكم ورحمة الله وبركاته،

يقوم الطالب عاطف محمد أبوحميد بإعداد دراسة بعنوان: " استخدام تكنولوجيا الاتصالات والمعلومات (ICT) كآلـية للتطوير التربوي في المدارس الحكومية الأردنية "، وذلك استكمالاً للحصول على درجة الدكتوراه تخصص تكنولوجيا تعليم من جامعة التكنولوجيا / سيدني في أستراليا ، ويحتاج ذلك إلى:

١. تطبيق استبانتين على عينة من مديري المدارس ومعلميها.

٢. اختيار مدرستين كدراسة حالة.

٣. إجراء مقابلات مع ذوي الاختصـاص.

في المدارس والأقسام التابعة لإدارتكم.

يرجى تسهيل مهمة الطالب المذكور وتقديم المساعدة الممكنة له.

مع وافر الاحترام

الدكتورة

صبحي فائق الحديدي

مدير إدارة البحث والتطوير التربوي

وزير التربية والتعليم

نسخة /للسيد رئيس قسم البحث التربوي

نسخة / للملف ١٠/٢

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