TOWARDS GREATER INTEGRATION OF ICT INTO THE TEACHING AND LEARNING PROCESS: A CASE STUDY OF THE SAUDI TATWEER PORTAL

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Wusmyah Abdullah Binothman

**School of Education
University of Leicester**

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Towards greater integration of ICT into the teaching and learning process: A case study of the Saudi Tatweer Portal   **Wusmyah Abdullah Binothman**

Abstract

Educational portals are increasingly being used in many educational systems in order to facilitate ICT integration into the teaching and learning process. In this study, the implementation of the Tatweer Portal in the Kingdom of Saudi Arabia at the trial stage was explored in four schools in the capital, Riyadh, as a case study. Several interviews were conducted with teachers, students and senior managers. Further questionnaires were distributed to both students and teachers. The main findings of this study are that there is great acceptance of the Portal among teachers and students. The main uses of the Portal were for communication and information. The study also emphasized that the school system plays a dominant role in the successful implementation of portals under five main categories of factors, which include financial infrastructure, pedagogic factors, motivation, teachers' professional development, and parental involvement. Both students and teachers very strongly suggested the appointment of a qualified full-time manager for the Portal in each school. Personal characteristics imposed slight differences amongst teachers as well as students in the way they perceived the Portal; however, these differences did not influence the outcome of this study. Finally, this study introduced two main implications for policy makers in the KSA. The first implication involves extensive revision of the policies of the Portal Project to meet the objectives of the new Saudi education strategy. The second implication is the extension of the trial period of Portal use to allow teachers and students to explore the advantages of the Portal Project.

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List of Abbreviations

AT	Activity theory
Becta	British Educational Communications and Technology Agency
CICT coordinator	Curriculum ICT coordinator
CPD	Continuous professional development
EFA	Exploratory factor analysis
ESCWA	Economic and Social Commission for Western Asia
EU	European Union
ICT	Information and communications technologies
IdM	Identity management
IDT	Innovation diffusion theory
INSET	In-service education and training
IWB	Interactive whiteboard
K-Net Portal	Knowledge-Net educational portal in Qatar
KSA	Kingdom of Saudi Arabia
K-12 education	Education from primary to secondary school
LA	Local authority
LAN	Local area network
LMS	Learning management system
LP	Learning platform
MAN	Metropolitan area network
MoE	Saudi Ministry of Education
NCSL	National College for School Leadership in the UK
NEA	National Education Association in the USA
PC	Personal computer
Peru EDUCA	Peru national educational portal
Portal	Tatweer Educational Portal in the KSA
QCA	Qualifications and Curriculum Authority
SLICT	Strategic Leadership in ICT in the UK
SPSS	Statistical Package for the Social Sciences
STS	Smart Tatweer Schools
TAM	Technology acceptance model

Tatweer   King Abdullah Bin Abdul-Aziz Project for the Development
                   of Saudi Education

Tatweer Wiki   Tatweer Educational Encyclopedia

UNESCO   United Nations Educational, Scientific and Cultural
                   Organization

WAN   Wide area network

Chapter One: Introduction

1.1 Research background

In the early 1990s, the term 'ICT' (the standard abbreviation for information and communications technologies) was coined in the educational field because of the wide availability of Internet technology for the public. As Kennewell et al. (2000 cited in Tondeur et al., 2009) explained, the letter 'C' in ICT refers to communications technology, and applies to, for example, the Internet and its communication applications. This availability came about as a result of the advent of Web 2.0 technologies. Successful ICT integration into teaching and learning is considered essential for any substantial reform process in any educational context. For instance, Vanderlinde and van Braak (2010:542) described ICT integration as 'a lever for instructional change', and Yuen et al. (2003) argued that ICT integration has a central role in any reform and innovation process for changing education systems. Therefore, many of the reform projects that are carried out in several countries aimed at reforming the education systems have included a comprehensive programme for the implementation of ICT in their teaching and learning process. The Tatweer Project in the Kingdom of Saudi Arabia (KSA) – the focus of the present study – is a case in point.

There are combinations of technological, organizational and pedagogical factors behind the successful integration of ICT into the teaching and learning process (Özdemir and Kılıç, 2007), in addition to external factors, such as the role of students' parents, that seem to have considerable influence upon students' ICT usage (Nasser et al., 2011). Hence, schools that use ICT as learning tools at the class level cannot produce a considerable change to their teaching and learning process, as they often show a disregard for pedagogic factors in relation to the use of ICT in the curriculum and learning process (Law, 2007; Law and Plomp, 2003). Hence, there is a compelling need for a shift from the implementation of ICT as a useful tool for learning through ICT. In other words, the successful integration of ICT into schools not only demands

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a technological change, but should also reflect pedagogical and organizational changes on the one hand (Cornu, 2004:231), and extend the learning process in after-school contexts on the other (Jewitt et al., 2010).

Web 2.0 applications have led to the implementation of an advanced generation of ICT (Web-based technology) that seems to be able to promote a move towards the integration of ICT into education, as it enhances sharing, communication and collaborative usage of ICT (Chai et al., 2010). Hammond (2014) highlighted the role of the widespread use of social networking websites to promote and increase the educational usage of the Web, particularly educational learning platforms (LPs), also known as *portals*. According to Becta (2006:3), school portals can be defined as online-compatible systems that function in four essential educational roles. The first of these fundamental roles is content management e.g., creating resources and submitting coursework. The second key role is curriculum mapping and planning, such as assessment of learners and planning lessons. The third is learner engagement and administration, including authentication, attendance recording and e-portfolios. The final important role is providing tools and services, such as discussion fora, email and Wikis.

There are now many countries, such as Qatar (Nasser, 2011), and Peru (Maldonado, 2011), which have established national educational portals in order to promote ICT integration in their education systems. The Portal Project in the KSA is one example. Further, there is an increase in the market for learning management systems (LMS) which have been integrated into portals on the Web. There are also a number of schools that have now managed their learning process through an LMS on the Web (De Smet et al., 2012). At around the same time, Jewitt et al. (2010:19) claimed in this regard that

> Learning platforms must be seen as an extension of schools' continuing use of ICT over the last ten years or so. In many cases learning platform technologies were now a fully integrated part of schools' "ICT cultures".

However, there is a lack of relevant literature on ICT integration in terms of empirical findings concerning the implementation of educational portals into the teaching and

learning process (Jewitt et al., 2011), as the central focus of most empirical studies is on the implementation of ICT in general. Therefore, the current study contributes to bridging this gap. This study explores the implementation of the Portal Project in Saudi schools at a trial stage, in terms of the Portal's acceptance, its benefits, factors influencing its implementation, and suggestions for successful Portal use from the perspective of students and teachers. Finally, the potential implications of the study findings are offered to Saudi educational policy makers and other stockholders, particularly teachers and students, for further improvement of the Portal Project.

1.2 Rationale behind the research

There is evidence that points to the implementation of LPs making slow progress in schools in comparison to higher education. For instance, Younie and Leask (2013a) provided a point of comparison between schools and universities in the UK in terms of the implementation of LPs that led to the conclusion that schools were in a lowly position in comparison with universities. However, few studies have attempted to explore the benefits and acceptance of these LMSs amongst teachers and students, and the practical implementation of LMSs into teaching and learning in schools (De Smet et al., 2012). Moreover, Jewitt et al. (2011:336) argued that there is a pressing need for more empirical studies concerning educational portals, as they stated that, 'Empirical evidence for the educational outcomes of LP technologies in schools is, however, limited, and most research to date has been small scale non-peer-reviewed action research'.

Furthermore, most of the studies that handle the implementation of ICT in the teaching and learning process are limited to the ICT use of teachers on the one hand, and ICT use during school hours (Nasser et al., 2011) on the other, without paying attention to the ICT use of students or the virtual learning environments of educational portals outside school hours. For example, Tearle (2004) proposed that conditions for the integration of ICT in the teaching and learning process outside school hours should be the central attention of further research. Likewise, Tondeur et al. (2008) called for a shift in the focus of studies about ICT integration into schools from ICT practice at the

classroom level to the integration of ICT into the teaching and learning process outside school hours. In addition, Tearle (2004), Tondeur et al. (2009) and Vanderlinde and van Braak (2010) indicated that most studies related to ICT implementation in education focus on ICT integration into the teaching process at the teacher level, rather than devoting attention to the ICT use of students. Hence, this study seeks to bridge the gap in this field, as it examines integrating ICT through the Tatweer Portal from the perspective of both the students and the teachers inside and outside school hours using the Portal in Saudi Arabia.

In the Saudi educational context, the implementation of ICT in education is a new notion and very few studies have addressed this issue in the KSA (Oyaid, 2009). Although the implementation of the Portal Project was at the trial stage at the time of the study, since there were no reports or research studies in this regard, the findings of this study offer possible implications for educational policy makers, school leaders, teachers, students and other stakeholders associated with the school system in the KSA to assist the advancement of the Portal and associated developments. Finally, a new Saudi educational strategy was announced during the time this study was being conducted. The current study has given careful consideration to this Saudi Government strategy as it seems that no research study about ICT implementation in the Saudi context was conducted after this strategy was formally announced.

1.3 Research questions

The main aim of this study is to explore ICT integration through the implementation of the Tatweer Portal at the experimental stage in Saudi schools from the perspective of teachers and students.

In order to fulfil this aim, the study has clarified five objectives:

1) To assess general acceptance of Portal use amongst teachers as well as among students.
2) To evaluate the potential usefulness of the Portal in terms of ICT integration into the teaching and learning process.

3) To identify the significant factors that influence implementation of the Portal in Saudi schools.

4) To examine the suggestions of teachers and students for successful implementation of the Portal Project.

5) To examine the significant differences based on personal characteristics among teachers as well as amongst students concerning the above four objectives.

1.4 The Portal Project

According to the Economic and Social Commission for Western Asia (ESCWA) (2007), the KSA achieved a low level of implementation of ICT in education in the years 2003 and 2005. This means that in the KSA during the period between 2003 and 2005, despite efforts to promote e-learning strategies, there was sporadic Internet provision with no plan for development. Although there was the existence of pilot e-school projects, they were without an action plan to generalize the experiment, and there was no clear e-educational plan at the national level (Mehzer, 2007:116). In response to this, the Eighth Saudi Five-Year Development Plan (2005-2009) was concerned with the implementation of ICT for the development of education. The goal of the Eighth Plan was to provide Internet access to all segments of society at reasonable prices (Saudi Ministry of Economy and Planning, 2005). In 2007 the National Plan for Communications and Information Technology was adopted, which included policies, programmes and projects required to develop communications applications and information technology such as e-commerce and e-learning (Saudi Ministry of Economy and Planning, 2010). The Tatweer Project was also established in 2007 (Saudi Ministry of Economy and Planning, 2010).

In more detail, the Saudi ICT Commission published a report of a survey conducted during the period from 2007 to 2009 about the use of computers and the Internet[1] in the KSA. The report found that there was a significant shift towards the use of broadband Internet instead of telephone lines (dial-up), as well as 53% of the

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[1] The Internet officially entered the KSA in 1997.

population of KSA owning a computer, with the percentage of Internet users at 40%. The report also indicated that there was satisfaction among schools regarding Internet service level, where most of the schools had turned to broadband. The schools surveyed spent an average of approximately $100 per month on the Internet. In addition, about 48% of these schools had developed their own online sites. However, the report stressed that schools in the KSA did not witness the evolution in terms of the numbers of computers compared to Saudi universities, as Web-based learning in schools needed to be developed (Saudi ICT Commission, 2010).

Furthermore, in 2007, the Tatweer Project was launched in order to reform the educational system in Saudi schools. The vision of the project was focused on the achievement of student-centred learning through open curricula, a technical educational environment, communicative relations, modern teaching methods, and self-directed professional development related to work and life. The Tatweer Project plan involved four key components: the Curricula Development Programme, the Teachers Qualification Programme, the Improvement of the Educational Environment Programme, and the Supporting Extra-Curricular Activity Programme. At the beginning of the Tatweer Project, 50 schools from all educational districts in the KSA were selected and dubbed 'Smart Tatweer Schools' (STSs). They were intended to serve as a pilot for all Tatweer programmes (Tatweer, 2008).

The STSs were equipped with a number of means of advanced ICT, as follows:

- A digital library: easily accessible through the Portal.

- Virtual labs: containing a range of software, computer-related tools and the Internet.

- Smart classrooms: containing a selection of high-quality equipment.

- Activity rooms: containing a set of the necessary equipment to provide training, practice and various other activities (Tatweer, 2008).

The STSs were linked to the Tatweer Portal; hence, in the Tatweer Project, the main vehicle for ICT integration is the Tatweer Portal Project (see Figure 1.1).
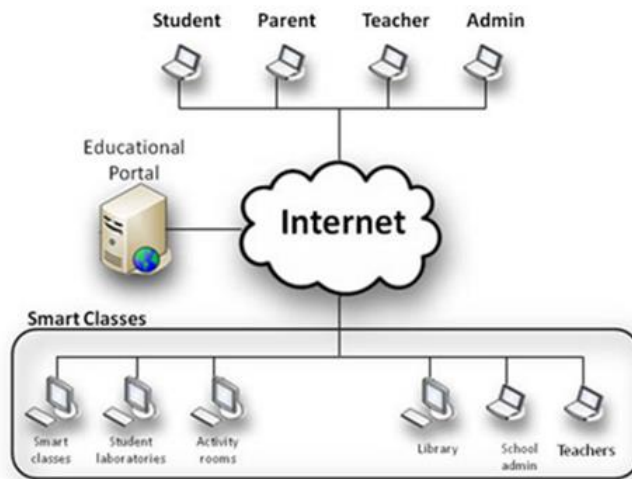
Figure 1.1: The STS system

(Source: Tatweer, 2008)

The Portal has four systems, in addition to the schools, teachers and students having a private website and email address. The main system is the Midan LMS, which is a comprehensive system for managing the learning and teaching process. The Midan system was built according to the MOODLE System. It combines the advantages of e-learning applications and provides an integral virtual learning environment and effective communication between teachers and students, as well as between teachers-teachers and students-students. The second system is that of the virtual classrooms, which allow teachers and students to have gatherings outside school through the Internet. The third system is the Tatweer Educational Encyclopedia (Wiki), which enables students to upload various learning resources within the Portal. Finally, the Portal has discussion fora specifically for Tatweer Units and the leaders, teachers and students of Tatweer Schools.

The Portal Project aims at developing a national educational portal that includes a complete system for learning management. It also aims to provide support for educational departments in Saudi districts to develop their own special educational portals, which will enable them to utilize technology to meet their needs (Tatweer, 2010). The vision of the Portal is that it has the aim of improving the learning environment, its rehabilitation and its configuration for integrating technology and employing digital curriculum content. The goal of the Portal is to build diverse

educational and multi-task applications for gatherings, meetings, teaching, communication and learning via the World Wide Web, providing resources and educational programs that can be accessed at any time from any place (Tatweer, 2011).

The Tatweer Project is responsible for constructing and designing a set of Portal systems, hosting these systems at the Tatweer Data Centre, and for resolving problems facing the Portal systems, both in terms of technical and organizational aspects. Furthermore, the Tatweer Project renders support and assistance for Portal users in the case of problems and difficulties facing them during their usage of the Portal. Technical support of the Tatweer Project is done in several ways, such as receiving observations and suggestions in general by users clicking the 'Contact us' icon on the Portal interface or by communicating with the Tatweer Project via a free helpline (Tatweer, 2011).

Since 2010, however, the 50 STSs have been discontinued, and the Tatweer Project has also been subject to extensive revision due to changes in the leadership of the project and the formulation of a new Saudi educational strategy. In more detail, a new Minister at the Saudi Educational Ministry was appointed who made certain changes within the Tatweer Project, the most substantial being naming a new director. Nevertheless, the Tatweer Portal Project was active at the experimental stage in the second term of the 2010 academic year in non-STSs belonging to three administrative districts: Riyadh, Asir and al-Zulfi in order to support the integration of ICT in the process of teaching and learning. The best administrative district award in terms of implementation of the Portal went to Riyadh District (four schools) in 2011. Hence, these four schools were used as case studies (see chapter three for more details).

There have been two main outcomes following the revision of the Tatweer Project. First, the Tatweer Holding Company was established in May 2012 - wholly owned by the Saudi Government - in order to work with the Ministry of Education to develop the educational system in the KSA. Hence, the Tatweer Company has exclusive rights to carry out Tatweer programmes and projects (Tatweer Company for Educational Services, 2013). Secondly, in 2011, a new Saudi Education Strategy was formulated in the KSA that adopted a new educational model (the New Model for Tatweer Schools) to be applied to all Saudi schools: 33,000 in total (Tatweer, 2013).

The construction of a New Model for Tatweer Schools formed the basis of many of the projects and programmes in the Tatweer Project (Tatweer Programme of the Development of Saudi Schools, 2012a). This model was implemented through the Programme for Development of Schools that was launched in 2011. The model was applied to 295 schools in education departments participating in a number of Saudi administrative districts, 30 schools in each district (15 boys' and 15 girls' schools), and five schools from each stage of education (elementary, intermediate and secondary). This was followed by entering into an expansion phase in 2013 with the accession of 14 educational administrative districts, where the total number of schools in which this programme was applied was 900^2 in 2013 (Tatweer Programme of the Development of Saudi Schools, 2013).

According to documents available from the New Model in the Tatweer Development of Schools Programme, there were no indicators for using the Midan System (LMS) of the Portal Project in the teaching and learning process. However, the model focused on using LMSs for administrative tasks in schools, including students' performance and communication with students' parents, rather than pedagogical practice (Tatweer Programme of the Development of Saudi Schools, 2012a).

Yet, there is no more information available from the website of the Tatweer Project regarding linking the New Model for Tatweer Schools and the Portal, nor for re-launching the Portal after the trial stage. In spite of the new Saudi strategy that indicated the Educational Portal and Digital Content Programme as a project for the implementation of technology into education, there was no available detailed information about this programme. There was also no link drawn between this programme with the Tatweer Portal Project on the one hand, and the other programmes in the new strategy related to the implementation of ICT in education, such as the e-schools programme and the electronic school management programme, on the other (Tatweer, 2013). However, according to the Saudi Ninth Five-Year Development Plan (2010-2014), the Portal is a very important national project for the implementation of

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[2] The website for the Tatweer Programme of the Development of Saudi Schools has been undergoing maintenance since 2014 and, for that reason, the total number of participating schools cannot be updated here.

ICT in Saudi schools (Saudi Ministry of Economy and Planning, 2010). Further, according to the latest news of the Tatweer Project, the Saudi Government appointed a new Minister of Education at the end of 2013. In addition, the Saudi Government offered 80 billion SR (around $21 billion) for new initiatives for an executive programme that was established in the middle of 2014 to reform the Tatweer Project. Therefore, the Tatweer Project has again been restructured and has been prepared for the implementation of new initiatives that include one for linking schools to the Internet, as well as implementing e-learning. This initiative is aimed at providing all schools with a broadband/high-speed Internet connection as well as changing all classes in schools to smart classes with the necessary technology. Finally, in 2015, a new director was selected for the Tatweer Project. Thus, it is likely that the Portal Project is undergoing further revision (Tatweer, 2015).

1.5 Structure of the thesis

This first chapter has presented an introduction to, and a rationale for, the study reported in this thesis. This remainder of the thesis is divided into seven further chapters. In the second chapter, the main body of the literature on the integration of ICT into schools is reviewed to build an initial framework. In the third chapter, the main methodological issues arising from this study are discussed. The fourth chapter analyses the qualitative data obtained from interviews with senior managers, teachers and students. The fifth chapter analyses the quantitative data gathered from the teachers' questionnaire, while the sixth chapter analyses the quantitative data from the students' questionnaires. The seventh chapter discusses the results of both the qualitative and quantitative data and synthesizes the findings. The eighth chapter is the conclusion, which consists of a summary of the results, the implications of the main findings, and the limitations of the study.

Chapter Two: Literature Review

2.1 Introduction

This chapter aims to build an initial framework for the implementation of educational portals into the teaching and learning process. However, there is a lack of empirical studies based on educational portals and LPs in general. For example, Jewitt et al. (2010:5) argued that 'there was little – if any – empirical literature on the integrated use of "learning platform" technologies in school settings'. Furthermore, Pynoo et al. (2012), in their case study in Belgium concerning general acceptance of the KlasCement Portal amongst teachers, found there was a large empirical gap in ICT literature in the educational context in this regard, so they used ICT literature as a framework in their study. Moreover, the portals in education are an advanced type of ICT, as mentioned in Chapter 1. Hence, in the current study, the literature on Web-based technology studies specifically and ICT implementation studies in general within the K-12 educational context was reviewed. The initial framework for the implementation of ICT is discussed under the following six headings:

- Changes and technological innovation in school education.
- The main relevant theoretical frameworks and practical models of ICT integration into the teaching and learning process. These are evaluated in order to identify the main dimensions of the initial framework.
- The ICT technological dimension related to ICT implementation.
- The ICT organizational dimension in the light of ICT implementation.
- The ICT pedagogical dimension in terms of ICT implementation.
- The dimension of students' parents' involvement concerning ICT implementation.

2.2 Changes and technological innovation in school education

There have recently been repeated attempts to form a number of theoretical frameworks for the diffusion of technological innovation in various disciplines, many

of which revolve around the general theoretical foundations of innovation diffusion theory (IDT) (Surry, 1997). These foundations were identified by Rogers (2003) under four categories: first, the process of innovation itself; second, the channels of communication used between the community targeted by the process of innovation; third, the length of time required to complete a process of innovation; and fourth, the social system covered by the innovation process. Therefore, the concept of innovation can account for the changes at either the macro (educational system) or micro (school) system level. However, IDT tends to classify technological innovation processes under various developmental stages, which in turn implies the existence of a linear relationship between the factors that influence the innovation process. Moreover, IDT determines a period for the completion of the process of innovation, while changes in the process of innovation require continuity without either interruption or a restricted time limit. Other writers (e.g., Fullan, 2008) argue that technological innovation is not a simple linear process, but is related to educational change that is 'unending' (Fullan, 2003:67). In addition, a linear relationship between innovation and change has its foundation in the principle of determinism, whereby infrastructure (including hardware and software) is regarded as the necessary first stage or basis of technology implementation/integration.

On the other hand, activity theory (AT) (e.g., Lim, 2002) does not oblige the limits of a definite system, making it difficult to explore the process of technological innovation through factors affecting innovativeness at a definite system level, such as the local school system, which seems to be the unit of change (Fullan, 2008:93), as this was used to investigate the process of ICT integration into pedagogical practices by a number of studies (e.g., Tearle, 2004; Tondeur et al., 2009; Vanderlinde and van Braak, 2010; Younie, 2007). In more detail, the theoretical frameworks based on AT in school education usually deal with the analysis of innovation technology at the macro level (the whole society) alongside the micro level (schools), as AT is concerned with all the issues surrounding schools at the national level. For example, Lim (2002) suggested a theoretical framework for the implementation of ICT in schools based on activity theory and sociocultural context, which takes cognisance of the external issues that have an impact on a school. This framework consists of four key aspects: the course of the study (classroom), including assessment and curriculum; school aspects

such as ICT facilities; the educational system, including the training of teachers and educational policies; and the aspect of society, such as employers. Finally, the framework is unable to explain the interrelations between the suggested issues. In other words, the main factors behind the key issues were unidentified.

In contrast, the technology acceptance model (TAM) focuses simply on technological innovation at the individual level, without giving necessary care to the study of technological innovation at a system level and the relation between the technological and other innovations within the system. The focus of this model is individual users' attitudes towards using specific products of technology according to two main beliefs: 1) the perceived usefulness of technology in terms of enhancing the professional performance of users; and 2) the perceived ease of use of a technological product (Davis, 1989). TAM aims at exploring the effective instructional utilisation of technological products (Surry, 1997). In recent related literature on the use of technology in education, this model is used to assess the degree of teachers' acceptance concerning either LPs, such as in the study by Pynoo et al. (2012), or LMSs, such as the study by De Smet et al. (2012). To summarize, TAM gives full attention to the technological aspect rather that other characteristics of the system, including organizational and cultural facets.

Changes concerning technology innovations at the organizational level, such as that of the school, include the completion of an effective regulatory framework, as well as working on the development of social, political and professional environments (Surry, 1997:7). This explains the interrelationship between the structural and cultural changes in the innovational process within the context of the development of school systems; in other words, a restructuring process to transform the professional culture of the school. This indicates that there are difficulties related to changing the culture of organizations such as schools through adopting new practices in the teaching and learning process, because cultural aspects are the focus of the changes resulting from sustainable innovation process. The practical reality in many of the educational reform policies reflects a chief preoccupation with structural aspects and indifference to the improvement of cultural ones (Fullan, 1993). This is also reflected in the direction of many educational studies interested in the implementation of technology to change

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school systems in linking the term 'innovation' with the concept of the development of the organizational aspects of a school or of restructuring a school (Surry, 1997:4).

Many concepts overlap in the context of the concept of innovation within the existing literature on the use of technology in education, such as reform, improvement, development, modernization and change. This enhances the overall concept of the term 'innovation'. Fullan (2008:30) defines innovation as 'multi-dimensional' in the field of school education. He gave examples of each dimension, while keeping the door open for further research into new ones. These examples include the following: 1) educational resources such as new or revised school curricula or technological means; 2) a new practice of learning that involves a change in strategies and educational activities; and 3) the development of educational beliefs. Innovation in education intervention within which new initiatives for the development of education are improved in any educational organization are also considered, and he included examples of these initiatives: new or amended curricula, educational policies, and organizational structures (Fullan, 1992).

Initiatives that are based on the use of technology in education are also an example of innovation. Nonetheless, a technological innovation is not considered an alternative to the generic term of sustainable innovation or innovativeness, contrary to what has been thought by some researchers (e.g., Rogers, 2003). Innovation in school education means the implementation of educational change through a dynamic system of variables, which involves interactions over time that aim to create new process practices, usually at the school level (Fullan, 2008). Thus, innovation is the process of continuous (sustainable) development and reform, and not just an initiative or a range of initiatives or project developments for education that end after a period of time. Some researchers have rectified this interpretation during revisions for new editions of their academic works (e.g., Rogers, 2003; Fullan, 2008). For example, Fullan (2008:11) emphasized:

> There is an important distinction to be made between innovation and innovativeness. The former concerns the content of a given new program, while the latter involves the capacities of an organization to engage in continuous improvement. Institutions can become innovative on a sustainable basis. There is a shift from innovation to innovativeness.

Accordingly, it seems that technological innovation in the field of education that aims to change for the better is considered part of the overall process of continuous innovations (inventiveness), and cannot be separated from the other forms of innovation, whether educational reform ideas, projects, educational policies, curriculum development projects, etc. (Fullan, 1992). Therefore, the current study attempts to consider factors involved in the process of educational inventiveness in schools that have an influence on ICT implementation into the teaching and learning process at the school level.

In the sense that the factors that affect technological innovation overlap with each other and have equal importance, Fullan (1992: 24) pointed out that considering one factor related to innovation as having the greatest impact in comparison with others is 'pointless'. Rather, he suggested, 'effective implementation depends on the *combination* of factors' (Fullan, 1992:26) rather than a linear sequence. Moreover, - as Younie (2007) noted - the implementation of ICT in school education can start with any factor related to the use of technology. Consequently, it can be argued that the incorporation or integration of technology, or the routine use of technology which leads to a change in educational practice, can be achieved only by combining all related factors. There may be the implementation of technology in education, and for a considerable time, but the process of integration, or routine, will not succeed due to the omission of some of the factors or giving attention to certain elements without others.

As pointed out in the above discussion, technological innovation is multidimensional. The general trend in previous studies limits these dimensions to two assumed categories: changes in organizational aspects and changes in cultural aspects, such as the study by Tondeur et al. (2009). Restructuring the organizational aspects of schools seems to be the 'surface meaning' of innovation, as explained by Fullan (2008:29), while the changing of cultural aspects involves a very 'deep meaning' of innovation. The cultural aspects represent the practical side of changing practice by altering the behaviours and changing the beliefs of the community at the system level, not at the level of individuals; for example, by building new skills and activities, changing the recognition of the importance of technological innovation, and a commitment to implementing innovation (Fullan, 1992:22). There are some studies that add a third

aspect to these two key dimensions regarding technological aspects, such as that by Wang (2008). In the current study, a new dimension related to students' parents is added, as this represents the community close to the school system, particularly in the case of learning platforms (LPs) (Jewitt et al., 2011).

However, the current study is focused on defining the key issues consisting of the factors affecting the success of technology innovation. Therefore, these suggested dimensions are simply a theoretical framework to explain the key issues of the technological innovation process. These dimensions are normally susceptible to change in accordance with alterations in factors and issues related to the success of technological innovation. Consequently, there are a number of studies, such as those by Becta (2011) and Younie (2007), that focus on the key issues of the success of technological innovation without paying attention to the dimensions that are used as guidelines, as indicated by Fullan (2008), in understanding and perceiving the issues and key factors in the success of technological innovation. Thus, in the next section, the main theoretical frameworks and practical models for ICT implementation in the relevant research literature on school education are evaluated.

2.3 Evaluation of relevant theoretical frameworks and practical models

The general framework of the United Nations Educational, Scientific and Cultural Organization (UNESCO) (2002) identified eight characteristics at the school level in relation to ICT development in secondary schools. The characteristics are as follows: the philosophy of learning and pedagogy; understanding the curriculum; assessment; ICT strategic vision; CT development plans and policies; ICT facilities and resources; the professional development of school staff; and the involvement of the community, such as parents, government agencies, the private sector and other educational institutions, in the school. The framework focused on categorizing the development of ICT at the school level under four main stages: an emerging stage, an applying stage, an integrating stage and a transforming stage, rather than giving more attention to determining the key factors under these characteristics in the schools themselves.

Finally, the framework acknowledged the involvement of parents in the development of ICT as the main key characteristic.

Tearle (2004) provided a practical model for technological innovation using one exemplary UK secondary school as a case study. The study used the mixed method approach of explanatory sequential design (with the quantitative research element approached first). The model was built on the basis of the school system as the unit of change. Tearle's model was also presented as a large circle containing three smaller ones coming inside each other circle as layers. The four circles, from the largest to the smallest, represent the following: school characteristics, the ICT implementation process, and individual characteristics, the smallest circle in the centre being the actual ICT usage in the teaching practice as a main indicator for achieving success in innovation.

The model described the factors that affect school characteristics positively as follows: a collaborative and adaptive culture, strong leadership, well-motivated staff, well-established internal processes in the whole school, and, finally, a positive attitude towards the external influences on schools. The model also indicated that planned ICT processes, resourcing, support and training are factors that influence the ICT implementation process. Finally, the model identified a positive attitude to ICT, belief in ICT, ICT knowledge and understanding, and ICT skills as factors that are involved in individual characteristics. However, the case study used to build the model was a single school and, moreover, the model was based on the use of ICT in teaching and ignored the practice of the learners.

Furthermore, Younie's study (2007) focused on exploring the factors, as well as operations at the school level that hinder or enhance the implementation of government policies relating to the implementation of ICT in schools in the UK during the period 1997-2003. The study used a grounded theory approach that depended on multiple case studies as well as a mixed research method to obtain an in-depth understanding of the phenomenon of the application of ICT in UK schools. The study was applied in 12 schools (primary and secondary) and included 113 teachers. The study results indicated that the practice of ICT in teaching was found in high schools at the department level (within the same department as well as across departments), and not

at the individual teacher level. This reflected the collective culture in the use of ICT among teachers within the schools.

Younie (2007) arrived at the conclusion that departments in high schools were often the locus of ICT change. Therefore, she highlighted the role of leadership at the department level in leading the associated technology change. This result contributes to bridging the gap in the literature in this regard, since relevant studies in the field of educational technology often tend to connect the leadership of the process of applying technology in teaching and learning with the leader of a school, who may be eligible administratively, but is often not qualified educationally to adopt this pivotal role in the application of educational technology.

Younie's (2007) study focused on the practice of teachers with technology but did not deal with the practice of students. Hence, the study focused on classifying the main factors affecting the application by teachers of the policies of technology within the classroom based on a number of themes (categories) that emerged during the process of analysing the quantitative and qualitative data gathered. Six key factors were identified: 1) pedagogy (the use of ICT in educational practice by teachers); 2) ICT infrastructure (ICT resources, technical support); 3) CPD for teachers (teacher training in ICT); 4) leadership (senior leaders in schools, heads of departments, and agents of change such as ICT coordinators); 5) the curriculum, assessment and how national initiatives interact with the ICT; and 6) the school culture (the role of this culture in the spirit of creating supportive communities of practice among teachers at the school for the implementation of ICT).

Thus, the above study moved away from the process of categorizing factors influencing the implementation of ICT policies under general dimensions, which was highly likely to lead to the exclusion of some important elements. Further, the study addressed the relations between these factors and concluded that the implementation of technology policies in education can begin with any factor, as these elements are intertwined, interdependent and complex. Younie (2007) found that:

> The categories that emerged led to the identification of key factors that affect implementation; understanding how these are connected led to the overarching concept of multidimensionality, which captures the dynamic and complex ways the factors interconnect (p.252).

Tondeur et al. (2009) studied ICT integration in primary education as an educational change. They conducted a survey of teachers' perspectives regarding structural and cultural school characteristics, as well as teachers' use of ICT in the classroom. The study was based on a theoretical framework that was drawn from the relevant literature on ICT innovation at the school level. Tondeur et al. argued that ICT integration at the school level depended on the characteristics of the school system, including structural and cultural changes, in achieving a technological innovation process at the school level. This outcome is compatible with the general trend in the studies in the literature. This framework outlined two main dimensions of ICT integration at the school level: structural school characteristics (e.g., ICT infrastructure, planning and support) and cultural school characteristics (e.g., supportive leadership, goal orientation and innovativeness concerning the implementation of ICT). The study used cluster analysis to divide the schools surveyed into two groups. The first group had cultural and structural characteristics that were relatively stronger than those in the second group. The level of computer use in the classrooms in the schools in the two groups was then compared. The study concluded that the strength of the characteristics of the school system supported the achievement of educational change through technological innovation.

It seems that Tondeur et al. (2009) used the term 'dimension' to describe a 'key factor' related to ICT integration. Further, they drew attention to the importance of the issue of the influence of the educational authorities on the school system in relation to ICT integration. Thus, the researchers claimed that it was difficult to control the factors that relate to the characteristics of the school system. The study emphasized the dynamic of technological innovation through continuous interaction between factors at the school level. Finally, they also confirmed the presence of a link between technological innovation and other educational innovations at the school level.

Vanderlinde and van Barak (2010) considered that conceptual frameworks in the studies in the literature related to the implementation of ICT in schools principally followed a qualitative approach. They argued that previous studies did not develop measurement scales to fit the design of quantitative studies for dealing with the complex nature of the process of the integration of ICT in educational practice. They pointed out that these frameworks were based on the perspective that the

implementation of ICT is an isolated phenomenon. In other words, these frameworks did not deal with ICT implementation as an integral part of the educational innovations (innovativeness) at the school level. Instead, these frameworks concentrated in particular on the characteristics associated with the teacher at the individual level, and ignored the social context (cultural variables) and organizational circumstances that surround the teachers at the school level. Thus, Vanderlinde and van Barak's (2010) study built an e-capacity model that focused on teachers' views concerning the integration of ICT in primary schools according to conditions related to school improvement at both the school and the teacher level.

The e-capacity model referred to above consists of concentric circles, each representing the level of the conditions that support the implementation of educational innovations in general on the one hand, and the use of ICT in particular on the other. There are a number of specific factors under each of these conditions. In more detail, these four conditions, from the larger to the smaller circle, are: 'school improvement conditions'; 'ICT-related school conditions'; 'ICT-related teacher conditions'; and 'teachers' actual use of ICT'. The school improvement conditions take account of leadership, participation in decision making, and collegiality. The ICT-related school conditions include ICT support, ICT coordination, the school's vision of ICT integration, ICT policy planning, and ICT infrastructure. The ICT-related teacher conditions embrace ICT teachers' professional development and teachers' ICT competence. Teachers' actual use of ICT includes the use of ICT as learning tools, ICT as basic skills and ICT as information tools. These four conditions surrounding the smaller twofold circle are composed of two principal elements: ICT curriculum and the use of ICT as a tool for instructional change. This twofold circle is in the centre of this model in order to emphasize the concept of the role of ICT in transforming the teaching and learning process as a type of educational innovation.

However, the e-capacity model only considered factors of ICT integration at the school level that affect teachers' circumstances and teachers' ICT use, with no attention paid to students' ICT settings. Moreover, the factors included in the initial version of this model, which relied on quantitative research methodology for the study (questionnaire), were selected based on the theoretical framework in literature-related studies. Furthermore, the study focused on measuring the variables for selected factors

rather than identifying the largest possible number of factors in relation to ICT integration.

Furthermore, the Becta Self-review Framework for the implementation of ICT at the school level consists of six constituent aspects (issues): 1) ICT leadership and management, which includes ICT vision, ICT strategy and information management strategy; 2) ICT planning in relation to pupils' use of ICT and its use in supporting the curriculum; 3) the role of ICT in the process of learning; 4) the assessment of ICT capability in terms of teaching and learning; 5) ICT professional development (ICT training for staff); and 6) ICT resources and technical support (Becta, 2011). This model focuses on the learners, making it 'close' in theoretical terms to the current study. However, this general self-review framework is designed as a guide to assessing and improving the use of ICT in UK schools as a whole, but lacks practical details of the operational factors that help or hinder ICT integration into the teaching and learning process.

Overall, it becomes clear from evaluating the above models and frameworks, as well as the common issues that influence the implementation of ICT, including portals, that they can be classified into four dimensions: technological, organizational, pedagogical, and parents' involvement. Thus, the initial framework of the current study will follow these categories, as discussed below.

2.4 The ICT technological dimension

The current section will deal with the technological dimension that affects ICT integration through educational portals. This dimension will be discussed under two issues: ICT infrastructure and designing educational portals.

2.4.1 ICT infrastructure

There is a mass of evidence existing in the literature on ICT integration regarding the teaching and learning process inside schools, linking good ICT infrastructure to successful ICT integration. ICT infrastructure is also necessary to be included in the procurement for the implementation of a portal into school practices (Passey, 2010). Khosrow-Pour and the Information Resources Management Association in the USA (2002:511) indicated that in the Early Initial Stage of integration of ICT, schools focus on allocating a budget for infrastructural development of ICT, including equipment and Internet services. In more detail, Austin and Anderson (2008:19) indicated that the integration of ICT into schools covers the term 'e-schools' because efficient LMSs in 'e-schools' are based on effective ICT infrastructures. Moreover, Way and Webb (2007, online) described effectual ICT infrastructure, which stimulates the integration of ICT into the teaching and learning process as a 'multifaceted connected environment'. They deduced that the ICT infrastructures that support integration of ICTs into the teaching and learning process include broadband/high-speed Internet connections for all computers in schools, good multimedia products such as digital cameras, e-mail addresses for regular communication between staff and students, and an official Internet website for the school.

Moreover, the UNESCO model emphasizes that the integration of ICTs into the school infrastructure requires the easy availability of access to teaching/learning resources via 'the school's Internet' during or outside school time, adequate computing facilities in schools such as laptop computers and computers in classes, and software applications that match e-learning styles (UNESCO, 2002:33). Toomey (2001:para 3) divided the ICT infrastructure under three general categories: hardware devices such as computers, software programs, and connectivity such as the Internet or local networking (cited in Lloyd, 2005:3). Similarly, Vanderlinde and van Breaka (2010:546) summarized key components of ICT infrastructure as follows: hardware devices, software applications and connectivity, to be outlined below.

- **ICT hardware**

Devices are essential for accessing an educational portal. Elston (2007:5-6) mentioned that ICT devices essentially consist of desktop/portable/laptop computers, computer printers, scanners, videoconferencing devices, TV cameras, CD players, CD recorders and interactive whiteboards (IWBs). However, Cuban and Tyack (1998:126) claimed that computers are the most powerful type of ICT hardware device in schools (cited in Krumsvik, 2006:243). In the case of access to a portal, this can be achieved with a range of devices (e.g., smart phones, iPads, etc.). However, the computer (desk machine or laptop) remains the most popular. For example, Jewitt et al. (2010) pointed to the importance of providing teachers and students with their own laptop computers for successful implementation of a portal.

Furthermore, interactive whiteboards (IWBs) support use of the portal in the classroom. Somyürek et al. (2009) indicated that the IWB is a necessary ICT device for schools. He illustrated his point with an example drawn from UK schools. IWBs are believed to encourage the teacher's involvement in the lesson, as the learners are monitored more effectively. It also boosts the courage of the less confident students, as IWBs can be used for group class activities where students have a chance to use the IWB directly to perform presentations or answer questions. Students tend to have different ways of learning, so IWBs help the teacher to meet the needs of different students, as pictures can be presented conveniently within each lesson. This allows students to visualize the lesson, which helps different students to varying degrees. As an IWB is directly attached to the teacher's laptop and the Internet, the Web can be used within the lesson to research certain topics or doubts deliberately generated by the teacher in order to train the learners to adopt this technique (UNESCO, 2005). Moreover, videoconferencing devices are very important in the use of portals in schools. For example, Comber et al. (2004) found clear evidence that highlights the great potential for using videoconferencing devices in schools.

Selwood and Tang (2007:56) also identified adequate supplies of ICT hardware devices in both sufficient quantity and high enough quality at the school level as a main factor that influences the effectiveness of ICT integration. In addition, Tearle (2004:337) acknowledged that the convenient location of ICT hardware devices is a

very important factor in terms of efficiency in the ICT integration process at the school level. For example, Comber et al. (2004:75) found that a lack of dedicated videoconferencing laboratories in schools leads to reduced flexibility over timetabling of lessons. In the same way, Lim (2007:99) indicated a need for greater flexibility in the way ICT devices are distributed in schools, especially in classrooms, in order to ensure that their locations bring sufficient flexibility and support a cooperative learning style.

▪ **ICT programs**

The advent of Web 2.0 technologies and their social networking approach, such as Twitter and wikis, has shifted applications in technology in most fields, including education, and contributed to the creation of a virtual environment that is in parallel with the real environment of the school (Chai et al., 2010).The development of educational programs has led to 'any time, any place' learning (Wheeler, 2001). In terms of ICT software applications requested for portal use, Stair and Reynolds (2009:13) indicated that there are two types of ICT software program: software for operational systems in computers (e.g., Microsoft Windows) and applications software (e.g., Microsoft Office). Further, software applications which are employed in a portal can be general ICT programs, for example word processing programs (e.g., Microsoft Office Word) or spreadsheet programs (e.g., Microsoft Office Excel) (Picciano, 2009:129), and Flash and Powerpoint are also essential to some extent. In addition, Kangro and Kangro (2004:32) recognized that multimedia applications are considered the main ICT software applications. Moreover, there are subject-based software applications which can be used by a portal. For example, Cox (2009:266) indicated the importance of ICT subject-based software for science subjects, mathematics, and other subjects in schools. Özdemir and Kılıç (2007:914) also suggested that subject-based software applications should match the content and language of curricula in schools. The software applications should support large quantities of formats (Youni and Leask, 2013b: 156).

▪ **Connectivity**

The availability of the Internet within the school is crucial when it comes to portal usage, as it is Web-based. Resources such as videos or facilities such as chat rooms also require fast Internet service in order to stream or load at a reasonable pace, hence more time is invested in the learning process. According to Kizza (2007:326-327), networks in the school context include three types. The first type is a local area network (LAN), which is aimed at connecting the computers inside schools together; second is a wide area network (WAN), which enables schools to use the Internet; and, thirdly, a metropolitan area network (MAN), which links schools with other organizations such as local educational authorities. Elston (2007:5-6) stated that modern schools require their infrastructure to have unlimited Internet access. In addition, Kangro and Kangro (2004:32) showed that e-mail and Internet sites are considered the main ICT infrastructures that profoundly influence LMSs in modern schools. UNESCO (2003) argued that bandwidth for Internet service is a key indicator for ICT infrastructure. The various types of bandwidth are high-speed, broadband and wireless. For example, Youni and Leask (2013b:170-171) indicated the importance of 'wireless networking' for effective use for Web-based technology such as LPs. Murray (2008a:120) showed that identity management (IdM) is an essential element concerning networks of schools. He suggested that schools create a personal password and a username for all users in order to manage their networks optimally.

2.4.2 Designing educational portals

Designing a suitable interface for an educational portal is critical for gaining acceptance by both teachers (Pynoo et al., 2012) and students (Maldonado, 2011). Further, Passey (2010) indicated that the features of the portal should meet the interests of users such as head teachers, teachers, subject leaders, administrators and students, as well as the parents of students. He also emphasized that parents should have direct access to the portal. Educational portals can be designed at a national level, such as the Peru National Educational Portal (Peru EDUCA), by which a single portal links a large number of schools (Maldonado, 2011). Portals can also be specifically designed for selected schools, such as the Knowledge-Net (K-Net) educational portal that is used

in 37 Qatari schools (Nasser, 2011). Wang (2008) confirmed the importance of designing the portal's site on the Web and choosing the operating system of the portal (the portal platform on the Web) carefully in order to integrate ICT in the learning and teaching process sufficiently and efficiently, as well as the site containing sufficient functions to do that. He also indicated that the chosen system must be user-friendly, which means realizing the interaction between the users and the portal's interface online. Moodle seems to be the most popular amongst commercial applications for hosting educational portals (De Smet et al., 2012).

There are three distinct types of educational portal: networking, organizational and resource-based. In the case of the KlasCement, all these were incorporated into the one portal, which is used by teachers (Pynoo et al., 2012). The Knowledge-Net portal is another example where all three features or types are found within a single portal (Nasser et al., 2011). Generally, a portal may encounter one, two or all three of the various types. A network portal may allow interactive communication between members via chat rooms or discussion fora. An organizational portal manages the learning process, which is achieved through an LMS. A resource-based portal enhances the storage and sharing of the resources that are gained through LMSs (e.g., weblinks) or solely (e.g., wikis) (De Smet et al., 2012). A wiki enables students to add information for the rest of the students to explore, modify, discuss and comment on. This helps in creating an atmosphere of creative thinking for the students (Chai et al., 2010).

2.5 The ICT organizational dimension

Bekkers et al. (2006) convincingly demonstrated that the integration of ICT (e.g., Web-based portals) into education is aimed at bringing about organizational change. Moreover, Tondeur et al. (2009) concluded that organizational factors are of cardinal importance to the integration of ICT into the teaching and learning process. However, they deduced that organizational issues are widely ignored in many empirical studies on the integration of ICT into schools. The literature recognizes a combination of key

issues involved in the ICT organizational aspect: ICT leadership, ICT policy and ICT professionalism.

For instance, Austin and Anderson (2008:154) stated that significant factors in bringing about ICT organizational changes in schools are effective ICT leadership, efficient ICT vision and professional ICT competencies. Further, a case study of a Taiwanese school examined three factors for the successful implementation of ICT in the teaching and learning process: effective ICT leadership from the principal, strategic policies, and the professional development of schoolteachers to stimulate innovation in their teaching profession through ICTs (Chen and Selwood, 2009:200). Hence, the following three issues - ICT leadership, ICT policy and ICT continuous professional development (CPD) for teachers - are discussed in detail in relation to the implementation of ICT into the teaching and learning process.

2.5.1 ICT leadership

Qablan et al. (2009) indicated that when leadership at a national level sponsors ICT integration, the process is more likely to succeed. Hence, for successful ICT integration in the teaching and learning process, the leadership at the national level, such as ministries of education or local authorities (LAs), have to sponsor projects of ICT implementation in schools, such as learning platforms (LPs) with sufficient funds as well as generally supporting the individual schools involved in such projects. In some countries, schools do not have an independent budget to manage their education development. For example, Oyaid (2009:175) found that in the KSA:

> The MoE[3] manages all local education authorities and schools centrally, no school or education authority is able to launch an initiative, introduce a new policy, or finance a project without prior consent from the Ministry.

At the school level, leadership has a profound role in achieving successful ICT implementation. Yee (2000) carried out a detailed case study of 10 schools in three

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[3] Saudi Ministry of Education.

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developed countries: the US, Canada and New Zealand. He defined eight categories of types of ICT leadership, as follows: 'equitable providing, learning-focused envisioning, adventurous learning, patient teaching, protective enabling, constant monitoring, entrepreneurial networking, and careful challenging' (Yee, 2000:291). Further, a comprehensive study conducted by Tubin (2007) concluded that there was adequate evidence to demonstrate the importance of school leadership for the integration of ICT into organizational aspects of schools (cited by McGarr and Kearney, 2009:89).

Furthermore, Hadjithoma and Karagiorgi (2009) found that leadership style in schools was the main influence upon the organizational issues concerning the integration of ICT into schools, such as the organizational beliefs and attitudes of the teachers and students. In more detail, Leng (2008) suggested that a transformational leadership style accelerated integration of ICT through eight key elements: promoting a shared clear vision of ICT, obtaining staff consent to goals and priorities in terms of ICT integration, offering personal ICT support for staff, improving encouragement of staff to respond flexibly to ICT integration, establishing an exemplary behaviour pattern in terms of ICT, arousing great performance expectations of ICT integration, developing a school culture regarding ICT integration, and creating collaborative ICT structures. Similarly, Afshari et al. (2008) highlighted that some key components of transformational leadership style regarding ICT integration, such as an idealized influence on staff, inspirational motivation of staff, intellectual stimulation for staff, and personal consideration of staff, contributed to enhancing the integration of ICT in the teaching and learning process.

In addition, Yuen et al. (2003) emphasized that the transformational leadership style of senior managers in schools is a strategic necessity for restructuring the organizational issues (vision, goals and objectives) in schools in order to achieve integration of ICT in the teaching and learning process. Chen and Selwood (2009) also inferred that a collective style of ICT leadership in schools is a critical factor for producing organizational changes in terms of ICT, because successful ICT integration in teaching and learning needs active involvement from members of all staff levels in schools in the integration process (Kirkman, 2000). In other words, senior managers' collective style of leadership in schools contributes substantially to developing the

trust and cooperation of staff in schools, and also increases the share of power over leadership of ICT with their school staff. In addition, the integration of ICT into schools needs effective leaders in order to develop a clear ICT vision, to enhance professional ICT development of schoolteachers, and to foster innovation in ICT pedagogical practices (Wong et al., 2008:251). Consequently, school principals have a great responsibility for effecting ICT organizational changes amongst all their members of staff (Begley, 1994, cited in Yuen et al., 2003:168). Effective pedagogical leadership will not be reached unless those in charge familiarize themselves with the ways in which ICT can be used to support teaching (McGarr and Kearney, 2009). Further, the message 'ICT is for all', if endorsed by the leadership, will encourage teachers, pupils and parents to become part of 'ICT culture' literacy (Selwyn et al., 2000).

Moreover, Harrison (1998) indicated that the behaviour pattern of staff towards the implementation of ICT is profoundly influenced by the positive attitudes of school leaders towards them. Lawson and Comber (1999:41) also pointed out that the constructive role of ICT coordinators in the implementation of ICT and the positive attitude of senior managers towards ICT are both crucial 'non-technical' factors behind the successful integration of ICT into schools. Thus, the integration of ICT needs a long-term change in the attitudes and beliefs of school leaders towards the strategic role of ICT in educational reforms. In other words, changes in school staff behaviour patterns in terms of ICT have a large impact upon the success of implementing ICT in schools (Pea, 1993, cited in Valanides et al., 2005:84). For instance, Fullan (1991 cited in Mumtaz, 2000) indicated that a limited understanding amongst members of schools (i.e., pupils and staff) of the importance of organizational change for the integration of ICT into the teaching and learning process is a chief obstacle for achieving integration of ICT.

In the same way, a detailed case study of different departments within a secondary school in the UK indicated that there was plentiful evidence to confirm the importance of changing attitudes of senior managers in schools, in particular subject leaders and ICT coordinators, in regard to the implementation of ICT. Further, the study concluded that the in-depth involvement of school principals in organizational change in schools

is one of the most significant factors in terms of greater integration of ICT in the teaching and learning process (Kirkman, 2000:46,50).

Hence, the UNESCO model for integrating ICT into the teaching and learning process draws attention to providing school staff and students with active support (technical support in particular) for the integration of ICT into teaching and learning process tasks through a development team, who work together as 'coordinators' for the necessary organizational change (UNESCO, 2002:56). Further, school leaders can manage their technical support through private companies that specialize in the technical aspects of ICT (Murray, 2008b:126). The leaders of schools should be able to manage their ICT resources (Kong, 2009; McGarr and Kearney, 2009). Finally, Tondeur et al. (2010:305) assessed the role of 'curriculum ICT (CICT) coordinators' concerning pedagogical support for ICT integration into the teaching and learning process and concluded that

> the support of an effective CICT coordinator in a school was an important factor in motivating staff and encouraging a whole school facilitation of ICT use to support learning.

2.5.2 ICT policy

According to the review of relevant studies in relation to policies for ICT implementation into schools, three key elements can be identified in this regard: formulating flexible ICT policies at the national level, developing strategic action plans at the school level for the implementation of these policies, and linking ICT policies with other policies concerning educational innovations. These elements are explained in detail below.

A detailed review of the literature in the field of technology and school education in a national context in countries around the world found that strategic policies related to the implementation of technology into the teaching and learning process are usually formulated at the national level (the educational system level) and it is the function of schools to implement, maintain and adapt these policies. The majority of previous

studies in this area acknowledged technological innovation as central to educational changes or reforms. UNESCO has indicated that a forward-thinking ICT policy is usually linked to the other national ICT strategies in nation states and is also tied in with fresh initiatives aimed at educational reform (UNESCO cited in Maroun et al., 2008). Similarly, Sánchez and Salinas (2008:1631) indicated that an effective ICT policy is usually designed to be articulated within other educational development schemes at the national level. However, national ICT policies are in urgent need of review because they have failed in many educational contexts. For example, in the UK, Hammond (2014:194) concluded that policy related to using technology in UK schooling is 'distorted', as well as having been pigeonholed as 'determinism', as a result of which this 'policy has tended to focus on the provision of new hardware, and an attempt to keep up with changing technological capabilities, rather than pedagogic understanding'. Similarly, Younie and Leask (2013b) referred to the failure of the ICT Policy (1980-2010) in England, as the policy placed more emphasis on the adoption of technology than the issue of pedagogy.

UNESCO (2004) has indicated that there are certain countries that have promoted ICT use in schools but had not formed official policies for using ICT in education. Some studies point to ICT policies often lacking continuity. For instance, in Greek schools, Fragkouli and Hammond (2007) found that successive governments had truncated existing policies and reformulated new ones at various times. The consequence has been that there are time constraints for schools to adjust to a change or to make any necessary provision for addressing new challenges, as the changes are often too frequent. This view is corroborated by Younie and Leask (2013a), who argued that national ICT policies in the UK need to be clear and sustained. Rapid changes and lack of political commitment to ICT, including developing learning platforms, will not ensure sustainable implementation and practice of ICT in UK schools. This continuous change obviously mainly influences efforts to develop the use of technology in schools effectively. Arguably, it may even be considered a sign of current failure to reach the desired change in the educational process in many ICT initiative projects.

Many researchers agree that an educational context in which there is a low degree of autonomy for schools in terms of managing their teaching and learning, where their educational authorities at the ministry level formulate the ICT policies for schools

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independently or with weak participation from the schools, leads to a low level of awareness in schools of ICT policies. This seems to have a negative impact on any ICT project or programme in schools. Oyaid (2009) noted that in the KSA there was the need for the Saudi Ministry of Education to raise awareness of the country's educational policies in relation to ICT, noting a low level of awareness of ICT among educationists and stakeholders, particularly teachers. In order to address this, Oyaid suggested the distribution of ICT educational policy documents to schools, and the Ministry of Education asking teachers for feedback on the documents. She further recommended that the Ministry of Education in the KSA should identify a government agency that would oversee the formulation, implementation and evaluation of ICT policies in the country.

Hence, the trend in the field calls for more systematic organizational change related to school systems to empower schools, especially in encouraging and enabling teachers at the class level to become actively involved in formulating and evaluating ICT policies at the system level concerning technological innovation. Valcke et al. (2007) argued that when schools are autonomous, the implementation of ICT policies is more effective. This also ensures that schools take responsibility for developing their own operational ICT policy plans to include elements such as ensuring quality control, student participation, the content of the school curricula and teachers' professional development. Younie (2007) also indicated the need to pay attention to schools since they form the social setting within which ICT policies are interpreted and implemented. Moreover, policy makers at the national level suffer from a lack of knowledge related to 'the opportunities opened up for new pedagogical approaches with technology' (Younie and Leask, 2013b:14).

Hammond (2014), for example, argued that there is a need for governments to formulate flexible ICT policies and to encourage teachers to provide feedback on these ICT policies. This argument is consistent with Oyaid's suggestion (2009) above in relation to the importance of the involvement of teachers in formulating ICT policies in the Saudi educational context. Tondeur et al. (2008) found that overlooking teachers in the development process of ICT policy can have a very negative effect on the integration of ICT at the class level, making the suggestion that the practical effectiveness of ICT policy requires teachers in schools to be aware of the content of

ICT development plans. Furthermore, Kollias and Kikis (2005:55) underlined the notion that ICT policies need an effective ICT vision, which should be designed not only by policy makers outside schools or senior managers in schools, such as ICT specialists or leaders of subjects, but all school staff, who should have a real opportunity to be involved in the development process of ICT strategic plans. In addition, Shaw and Edward (2005) suggested that all staff in schools should be entitled to share in long-term ICT plans and make a continued commitment to the integration of ICT into the teaching and learning processes in order to stem any possible misunderstanding between top and bottom management levels in schools (cited in Hadjithoma and Karagiorgi, 2009:90).

The operational strategic ICT policy plans at the school level are very important for transferring national ICT policies into practice at the classroom level. Valcke et al. (2007) reported that ICT was central to school policies in Flanders; however, they noted that some schools had no clear-cut policy plans regarding ICT. Seng and Choo (2008:180) recommended that schools should formulate their ICT plans for the implementation of ICT policies at the national level according to their real needs. Lawson and Comber (1999:45) found that 'a forward looking ICT policy' is one of the main characteristics of 'integrative schools' in terms of implementing ICT in the teaching and learning process. However, according to Fragkouli and Hammond (2007), although teachers obviously had to use ICT in their schools, there was no specific plan regarding the use of ICT. In the view of Lawson and Comber (1999), the presence of an ICT policy in schools contributed to a positive attitude towards the use of ICT amongst teachers. A similar situation was observed in primary schools in Flanders by Tondeur et al. (2008), who found a positive relationship between the development of an ICT plan and subsequent actions taken in schools. It can, therefore, be discerned from the views of Fragkouli and Hammond (2007) and Lawson and Comber (1999) that the presence of ICT policy plans in schools has a tendency to elicit positive attitudes towards ICT use and practice.

Inclusive ICT policy action plans that address the finest details are an important element in the success of the implementation of technology in schools. In more detail, it has been suggested that realistic goals and practicable means are key elements in ICT policy plans (Bryderup and Kowalski, 2002, cited in Tondeur et al., 2009:226).

According to Younie (2006), ICT implementation should be carried out on several fronts in terms of infrastructure and the development of values regarding the practice of ICT in the classroom. In this context, Mooij (2009) pointed out that the effectiveness of ICT policy plans is dependent on their capacity for continuous innovation in schools. Similarly, Kollias and Kikis (2005) determined that good ICT action plans enhanced the quality of the teaching and learning process in schools.

As argued earlier in this chapter, technological innovation has an interrelation with other education innovations. Hence, other policies for educational innovations is a prerequisite for supportive ICT policies. For example, Kale and Goh (2014) suggested that the school curriculum should be restructured and adjusted to allow teachers adequate time for the use and practice of ICT. This would address many of the concerns teachers raise about ICT implementation. Somekh (2007) pointed to the influence of students' assessment systems at the national level on ICT pedagogic practice in schools. Moreover, Younie and Leask (2013a) suggested that as part of the change in the management process, the use of online portals for teaching and learning must be enforced in ICT policies as part of teachers' appraisal processes. Fragkouli and Hammond (2007) indicated the importance of setting systems to motivate teachers concerning the implementation of technology. Finally, there is a need for central government to extend learning into students' homes at the ICT policy level (Somekh, 2007:48).

To summarize, three major operational factors arose from the discussion of this subsection related to ICT Policy: first, the participation of schools, especially teachers, in designing ICT policies; second, schools having strategic plans to implement ICT policies and third, matching ICT policies with other policies of educational innovations at the educational system level.

2.5.3 ICT CPD for teachers

Continuous professional development (CPD) is a concept that is employed in most countries to update the knowledge of teachers and improve their teaching practice. Younie (2007) explains CPD as the concept of meeting teachers' training needs in

terms of their professional development, and this includes upgrading their skills and practice through ICT training. CPD stands out in the literature on the use of technology in education as a fundamental issue with regard to achieving changes for sustainable innovations or inventiveness in educational institutions, especially schools. For example, Fullan (1992:24) stressed that CPD comes hand in hand with the school development process, as both 'must be the focus of long-term change strategies'. In addition, he concluded that the issue of CPD was closely interrelated with the implementation of innovations and student performance at the school level.

In other words, it seems that facilitating the rapid development of schoolteachers regarding efficient use of ICT is an important concern in bringing about systemic change in schools. Hence, in a global context, there is heightened awareness about the need for schoolteachers to be effective and knowledgeable users of ICT through in-service and pre-service training (Cornu, 2001; Davis, 2000; Desforges, 2001 cited in Nicholson and Wacht, 2002:113). Teachers should be tested in computer literacy to ensure that they be able to judge when ICT has a clear and positive effect and where it is redundant or inappropriate (Krumsvik, 2006). The willingness of teachers to become engaged in ICT CPD is a product of their individual initiatives (Valckel et al., 2007). Forte and Flores (2014) underscored the need for ICT CPD in the in-service education and training of teachers (INSET) programmes in modern educational institutions. Yuen et al. (2003:162) signified effective ICT CPD in schools by stating that

> successful implementation of change ICT is not about equipment or software but influencing and empowering teachers; it is not about acquiring computer skills, but supporting teachers in the ongoing engagement with students in their learning.

According to a number of relevant studies (e.g., Forte and Flores, 2014; Fragkouli and Hammond, 2007; Jewitt et al., 2010; Leask and Younie, 2013; Wikan and Molster, 2011; Younie and Leask, 2013a), it is likely that effective ICT CPD consists of specific vital elements, including the capacity of CPD to change the culture of educational systems at the school level through changing pedagogical practices; managing formal CPD at the school level; taking account of the differences between teachers in terms of their age, ICT skill level or their speciality when designing formal ICT training programmes; a formal CPD approach based on cooperation amongst groups or teamwork at the school level; CPD based on long formal ICT training courses; and,

finally, the encouragement of informal CPD in schools amongst teachers, including that taking place in real environments or through virtual environments such as learning platforms or virtual communication amongst teachers, such as teachers' discussion fora. These elements are discussed in more detail below with illustrative examples from related studies.

Many studies that have attempted to evaluate formal programmes of training in technology in different national educational contexts, such as the UK, US, New Zealand, Portugal, Italy and Greece, have found that many such programmes were essentially concerned with technical aspects and skills, with an obvious omission of a focus on a change in the pedagogical practice of the technology required by teachers during their daily work routine. In other words, it seems that these programmes were based on the philosophy of determinism in the use of technology in education, without regard for the development of educational practices which should be the strategic goal of the use of technological innovation in the domain of education. For instance, Becker and Riel (2001), Kenny (2002) and Selinger (2001) claimed that most ICT training programmes were designed to develop the necessary skill in exploiting ICT for teachers but neglected the great potential of ICT to change pedagogical practice in schools (cited in Valanides et al., 2005:81).

In Portugal, Forte and Flores (2014) explained that the focus of INSET as CPD should be on the development of classrooms skills and instructional activities. This, according to Forte and Flores (2014), is what will ensure the success of INSET for Portuguese schoolteachers. Furthermore, Bottino (2003:44), in the context of Italian school education, clarified that the professionalism of schoolteachers in ICT was fulfilled by acquiring both professional competence in ICT skills, as well as the integration of ICT in pedagogical practice; both are just as important. The New Zealand government also set up an online programme for schools in 1999, named Interactive Education Strategies for Schools. The programme was designed to develop the professionalism of schoolteachers in terms of ICT. However, the programme tended to focus upon basic ICT skills, without devoting special attention to their integration into pedagogy (Lai, 2002:345). Further, in the New Zealand context, Lamont (2002:848) produced clear evidence that demonstrated that the professionalism of schoolteachers in terms of integrating ICT into their teaching strategy included two aspects: ICT pedagogical

practice and professional ICT skills. Hence, he suggested that ICT training programmes in New Zealand schools should meet the individual requirements of schoolteachers at different stages of the implementation of ICT.

In addition, the UNESCO model for the integration of ICT into schools indicates that ICT training for schoolteachers should include how to integrate ICT in their teaching objectives; how to manage the learning process in their classrooms through ICT tools; how to make ICT assessment procedures for measuring their students' progress; how to communicate with their students and colleagues through ICT tools; and, finally, how to develop ICT professionalism amongst their students (UNESCO, 2002:50-51). In US schools, however, the majority of ICT training programmes have tended to focus on basic skills acquisition for schoolteachers in ICT (Centre for Educational Research and Innovation, 2001:26-27).

Similarly, Younie and Leask (2013a) reported on the desire by teachers in selected UK schools for CPD in learning platforms. As part of their findings, they indicated that teachers needed technical and pedagogical training in both forms of CPD - formal and informal - to enhance the implementation of LPs, principally, their distinctive features, into pedagogical practices. Likewise, Elliot et al. (2014) examined the challenges facing the use of the Glow Portal by schools in Scotland. According to the researchers, there was a challenge in using this multimedia portal as it presented a host of problems which required urgent CPD for teachers concerning the curriculum content of science, pedagogical practice, and the innovative implementation of ICT-related science.

In the same way, Valcke et al. (2007) provided practical suggestions for shifting ICT training programming to focus on pedagogical aspects. They criticized the current ICT CPD of Flemish science teachers, stating that it was seen more as a personal development skill rather than as a tool for effective teaching. They found a lack of training for improving the ability of teachers to use ICT in their cross- and extra-curricular activities. They called for implementing group work and projects to reach a more effective method of training teachers. Fragkouli and Hammond (2007) also identified a challenge in a one-year ICT training programme designed for philology schoolteachers in Greece related to how ICT was adopted in subject teaching. Thus, in their view, it was important to provide the needed practical sessions in real classes for teachers to better understand technology. They also suggested avoiding ICT training

based on a theoretical foundation and focusing on training based on the modelling of ICT pedagogical practice in school subjects.

There are underlying trends towards a shift in ICT training programmes for teachers in schools away from didactic and out-of-context ICT skills training to subject-specific ICT programmes. However, the lack of a subject-specific focus in ICT training programmes for teachers remains a central issue in many countries (Valanides et al., 2005). Schibeci et al. (2008:323-324), in terms of 'an ICT development project' conducted in 12 Australian primary schools, found that

> Professional development changed over the period of the project, from technical support to curriculum integration....Other teaching and learning issues emerged, such as classroom management, collaborative learning, student centred learning, teacher collaborative planning and cross-curriculum issues.

The relevant literature includes indicators for effective formal ICT training of teachers, providing schools with full autonomy to manage their training based on the real needs of their teachers. For example, Forte and Flores (2014) emphasized that strict organizational controls of INSET at the national level hinders CPD in schools. There are a number of considerations that are appropriate to be taken into account for official training programmes. Valcke et al. (2007) proposed that training that is done during school time was more effective. Fragkouli and Hammond (2007) agreed with this assertion, as they noted that training after school hours was seen as a burden and did not elicit teachers' concentration. Moreover, a practical evaluation of ICT in teaching in Virginia in the US was carried out by Kale and Goh (2014). In their study, a Web service was used as a medium for teaching to investigate the relationship between teachers' ages and ICT literacy. They concluded that ICT CPD 'based on a one-time, one-size-fits-all approach' seemed not to be of value for teachers, since it did not consider their different needs (Kale and Goh 2014:54). In terms of specific training related to a portal, Jewitt et al. (2010) found that formal training could be of various types, such as workshops, regular meetings and short training sessions. Finally, a study conducted by Wikan and Molster (2011) in three Norwegian secondary schools indicated that long-term formal ICT training within schools seemed to have a greater positive influence on teachers' acceptance of ICT in comparison with formal short-term ICT training.

There has been a clear trend in recent studies carried out on the implementation of technology in education highlighting the growing importance of non-formal training at the school level in comparison with formal training (e.g., Forte and Flores 2014; Hadjithoma and Karagiorgi, 2009; Younie and Leask, 2013a). The main reason for this may be that school improvement and development require rapid transition from an individual culture to the concept of a collaborative work culture (Fullan, 1992). Forte and Flores (2014), for example, identified the importance of collaboration among teachers in schools for the effective use of ICT. In particular, they mentioned the need for meetings and the continuous sharing of ideas within the school setting as important sources of collaboration. They reported from the study that teachers had also identified the challenges of collaborative work. The teachers in the study had responded that the major challenges to collaboration were time constraints and the need for better working conditions and these were more relevant than their willingness to work together (Forte and Flores, 2014). In a Cypriot primary school context, Hadjithoma and Karagiorgi (2009) showed that training does not have to take the form of externally developed seminars; it could be performed as team teaching, action research or mentoring within the school. Using such approaches reduced the likelihood of negative attitudes arising when teachers are trained in ICT and educational applications. Moreover, the majority of the teachers within the schools studied referred to their colleagues for assistance in ICT use in the classroom.

Indeed, informal ICT CPD through peer support has been found to be an effective method of CPD training amongst teachers. Younie and Leask (2013a) found that using a serving teacher as a peer trainer was highly effective because teachers learned better from colleagues than from non-teacher agents. Moreover, Younie (2007) indicated the vital role of various departments in secondary schools in the UK related to informal CPD through cooperation amongst teachers for ICT pedagogical practice in comparison with individual training. Leask and Younie (2013) also stressed the importance of informal online peer support and indicated the need for knowledge management. They described how an e-infrastructure could be put in place for knowledge sharing nationally and internationally amongst teachers. They also discussed the benefits that could be derived from the provision of e-infrastructure but cautioned that if this were done under official state dominance, it was more likely to collapse with a political alteration in government.

Younie and Leask (2013a) further stated that using LPs to support the informal CPD of teachers would improve their professional development. They suggested the use of LP applications, such as blogs, fora or wikis, for CPD. They also argued that where there is informal peer support for CPD, teachers collaborated in the use of resources. Teachers were also willing to share their pedagogic skills. In their conclusion, Younie and Leask (2013a) noted that using LPs as a way of training teachers was largely absent, compared with what pertained in universities. Likewise, Jewitt et al. (2010) pointed out the importance of the use of support features on LPs.

To conclude, there are three main operational factors which emerged from the discussion above for achieving effective ICT CPD that would be able to produce significant change in pedagogical practices at the classroom level: first, giving complete autonomy for schools to manage their ICT training needs; second, focusing on informal ICT training based on cooperation between teachers in as well as out of school; and third, redesigning ICT programmes to support mainly pedagogical aspects.

2.6 The pedagogical dimension of ICT

There are several roles that technology could play to enrich pedagogical practice in schools. Technology is important for the improvement of basic learning skills for students; hence, the study of information technology is an independent curriculum in most educational systems. Nevertheless, technological innovation is mainly concerned with the use of technology across all school subjects to improve, develop, and change educational practice (Davis, 2001). ICT is assumed to have an impact on the construction of learning (Somekh, 2007). However, the reality of education in many schools shows extreme weakness in terms of the potential of technology to support and enhance pedagogical practice. For example, Somekh (2007:46) suggested that there was misunderstanding at the level of policy making, which seems to have led to a focus on teaching ICT skills at the expense of the use of ICT to construct learning activities. Loveless et al. (2001) explained that the common definition of the term 'pedagogy' as the science or art of teaching does not give any details of interpretations and assumptions about the 'nature of science, art or teaching'.

Moreover, this term could be defined as a cultural practice related to education in schools (Giroux, 1997, cited in Loveless et al., 2001:64).

It is necessary to link cultural practice with the organizational aspects of educational practice at the level of the education system (the school). As changing pedagogical practice not only occurs at the individual level (the teacher), it is important to understand educational innovation as an essential function of any education system. This is linked to the reformulation of the objectives of education, restructuring schools, and the development of reward systems which can enable both teachers and students to participate on an equal footing in the construction of the various learning activities in the classroom (Somekh, 2007). Moreover, formalized bureaucratic structures in a school could act as a barrier to the achievement of technological innovation (ibid.).

The concept of changing pedagogy using ICT is linked to changes at the following three levels: the teacher, the student, and knowledge (Lusted, 1986, cited in Somekh, 2007). Thus, technological innovation has an impact on teaching methods (teaching approaches) and the interaction between learners and teachers as well as the curriculum (Loveless et al., 2001).

The term 'ICT pedagogy' in the educational context refers to the greater pedagogical integration of ICT into schools that changes the teacher-centred learning process to a student-centred one (Jimoyiannis, 2008:334). Tubin et al. (2003:131) identified four domains of pedagogical innovation: the 'time and space configuration', the students' role, the teachers' role, and the curricula. However, the majority of studies associated with the implementation of ICT in schools have identified three central issues to ICT pedagogy: curriculum reforms, pedagogical practice, and assessment procedures. Yildirim et al. (2003:224) made the suggestion that the integration of ICT into schools should produce far-reaching changes to patterns in the teaching and learning processes in these three essential elements. Examples of this can change processes found in advanced countries such as South Korea and Singapore, which have launched national practical initiatives for greater integration of ICT in their schooling systems in order to make revolutionary changes in their curricula, pedagogic practices and assessment criteria (Cheng and Tam, 2007:261).

In summary, the ICT pedagogical aspect seems to encompass four issues: teachers' practice, students' practice, the curriculum and the assessment of student attainment, to be discussed in more detail below.

2.6.1 Teachers' pedagogical practice and ICT

Technological innovation in schooling systems seems to have a revolutionary potential to change pedagogical practice. Technological innovation involves achieving comprehensive changes in knowledge, understanding, skills, beliefs and goals, in particular those related to forming teachers' practice in order to facilitate the transformation to a new educational system. This, in turn, leads to a change in the nature of the interaction between teachers and students, where the border between the roles of teacher and learner seems to become less clear (Davis et al., 1997). The role of the teacher in educational environments used for technology is still crucial, where he/she seems to be responsible for changing the structure and culture of the instructional activities of the students (Dawes, 2001). Technological innovation will apply different roles to both teachers and students, as student-centred lessons require students to work independently (Gobbo and Girardi, 2001).

Nevertheless, there is clear evidence from relevant studies that indicates that teachers do not, in fact, transform or change their teaching methods commensurate with the use of technology, including changes in the traditional methods of management and control of the learning tasks for their students (Loveless et al., 2001:69). Moreover, Pynoo et al. (2012) concluded that only a small number of teachers were found to use the advanced features of the KlasCement portal in Belgium, which was intended to add value to learning and teaching practice. One change that can clearly be seen in teachers when they use ICT in their lessons is that they alter their teaching methods, but there is a deep and important alteration in the beliefs about learning using technology that is always ignored (Selinger, 1999:36). When teachers use ICT in their teaching, they need to strengthen their beliefs about the ability of ICT to develop knowledge related to their school subject (curriculum). In addition, teachers need to think about changing the teaching strategies they use so that they are in line with the application of technology (Loveless et al., 2001).

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According to the related literature, there are significant challenges/barriers to successful ICT implementation in the pedagogical practice of teachers. For example, any shift in a teacher's practice means a change in the traditional routine of teaching and learning in the school organisation at the classroom level. This process is often risky because teachers usually believe that the occurrence of any kind of change in the traditional school routine to which they are accustomed will cost them more time in learning new teaching approaches and greater effort in re-planning their school curriculum in a different way on the one hand, and the quest to collect new educational information on the other. It is for this reason, therefore, as Loveless et al. (2001:82) have suggested, that the continuing professional development of teachers should not only focus on the demands for change placed upon teachers' knowledge and practice beliefs, but might also carefully look at the high cost of the absence of professional development for teachers to address effectively the purposes of the teaching profession in the new informatics era.

Furthermore, teachers' belief that their responsibility while using ICT in the curriculum is limited to acting as a facilitator for students to use technology in education would be counterproductive to the process of change towards greater creativity and continuous innovation in the learning process amongst students. Hence, the real role of the teacher is to teach as an expert in the educational context in technological environments (Cox, 1998, cited in Cox, 1999). In more detail, teachers are not to be seen as mere providers of information, but as 'experts' who direct and instruct students and have the ability to engage their students in interactions during discussions. This is in line with the new perspective that considers that modern schools are not places that provide curricula for groups of 30 students, but educational institutions that provide an integrated educational programme that includes educational aspects, social elements, arts, and even athletics (Loveless, 2003:125).

Similarly, Cox (999) argued that the teacher's role in *directing* students to the use of ICT can either enhance or hinder students' attitudes in the direction of technological innovation. The role of the teacher should be focused on motivating students and changing their behaviour and beliefs about the use of technology in the learning process. Moreover, the reduced control of the teacher over the new knowledge does not diminish the role of the teacher. The role of the teacher is intended to motivate

students through work as scaffolding to absorb new information and to turn it into knowledge and understanding within a caring and supportive learning environment (Selinger, 2001b). According to Maybin et al. (1992:188-9, cited in Scrimshaw, 1997:110-111), 'scaffolding' is a form of help that will enable learners to accomplish a task they cannot manage on their own, which aims to take learners closer to a state of competence that will assist them eventually to complete the task on their own.

Another considerable challenge facing teachers in terms of ICT implementation in teachers' pedagogical practice is the need to develop their awareness of the educational purposes of the use of technology (Dawes, 2001). Teachers' awareness of the purpose of the educational use of technology to perform certain educational tasks in the curriculum will help them choose an appropriate technological tool (Loveless, 2003). For example, if teachers want to reserve a computer room for a lesson, they should be aware of the educational purpose of the existence of the whole classroom in working on computers at the same time. In addition, teachers need to ensure that the technology chosen provides a positive contribution to educational practice that might not be provided using other, traditional teaching methods (Selinger, 1999). This seems to support the notion that the practices of teachers are should to reflect their educational goals, which in turn reflect in one way or another their point of view about knowledge, learning activities and required assessment, as well as their understanding of the roles of and relationships between teachers and learners (Loveless, 2003).

Furthermore, teachers are responsible for the construction process of the implementation of technology in learning tasks as a culture for achieving valuable learning, as well as creativity and constant innovation. Therefore, using technology to perform new educational tasks that could not be completed using other teaching approaches would pose a major challenge for teachers (Somekh, 1997); in other words, avoiding the use of technology where there is a sense of duplicating previous educational tasks. When teachers use technology software, it is also appropriate to take into account the educational philosophy and teaching methods that are designed to be used with that software, and avoid using their favourite educational philosophies or familiar traditional teaching methods (Scrimshaw, 1997). Moreover, during educational practice using ICT, teachers need to be highly efficient in the use of technology, as well as confident in dealing with the tools of technology, although this

in itself is not sufficient. Teachers would also take on a big challenge in relation to understanding how to manage a classroom during the educational use of technology, rather than focusing on providing technical assistance for students in the use of technology (Somekh, 1997:114).

Further, teachers need to deal with some of the challenges that hinder technological innovation such as avoiding conflicting priorities, for example, the implementation of a variety of other changes, and seeking professional development in other areas of teaching experience. As well as increasing the number of students in the classroom, this also increases the workload due to external inspection procedures outside the school, and, finally, limits the time available to teachers (Dawes, 2001).

In terms of the potential of ICT implementation for schools/teachers that would help bring about the predicted changes to pedagogy, a common assumption to be found in the literature relating to the integration of technology into the national curricula in schools is that it will prompt a significant shift in the traditional role of the teacher. For example, in a study conducted by Almås and Krumsvik (2008), teachers declared that ICT was an essential part of the teaching process; they could not 'manage' without it. As they recognized the importance of ICT, this also illustrated that their digital literacy had grown, as their vision of using ICT as a mere tool had changed to viewing it as a means of changing their pedagogical practice. In another study, conducted by Gobbo and Girardi (2001), where only four of the 24 teachers who took part made regular use of the Internet and web pages, it was found that competent teachers tended to achieve greater integration as opposed to those with a low level of competence. However, exceptions occurred where teachers with low competence levels had a high use of ICT in class. There were clear indications that the technology had the potential to support the learning process for students cognitively and socially in unique and innovative ways (Loveless, 2003:121). Therefore, the role of teachers is not only to teach using technology, but also to educate students in how to use technology in the learning process in a way that enables the achievement of innovation in that process (Dawes, 2001).

Another source of potential is that the new role of the teacher, with the use of advanced technology, particularly that which is Web-based, will be supportive of students'

learning in the best possible way by recognizing the different new needs of learners. This means enabling students to have access to new knowledge outside the framework of the traditional approach, instead of restricting such access. The role of the teacher is also expected to be that of a supporter in developing the skills that will enable learners to access new information and consider alternative perspectives outside the classroom context. Therefore, the teacher will have a new task concerning guiding students about the validity and reliability of new information, as well as the credibility of the available knowledge sources (Selinger, 2001b). This leads to an expansion of the teacher's role as a 'content presenter', which is reinforced by Uibu and Kikas (2008) and Wheeler (2001), in that the teacher has greater responsibility for checking the accuracy of the resources used by the learners, which is time-consuming and increases the workload for teachers. Teachers then adopt the role of mediator. Simultaneously, there is a reduction in the role of the teacher as a distributer. Technological innovation in schools imposes the need for teachers as officials to raise awareness of e-safety amongst their students, which includes the evaluation of online sources of information and avoiding the exchange of personal information via the Internet (Younie and Leask, 2013b:144).

In addition, ICT implementation has the potential to enhance collaborative learning among students, as using ICT contributes to the cognitive and social development of students' learning, as well as providing teachers with flexibility in the teaching process. For example, a team-working approach involving a number of students working on one computer is not necessarily due to limited technology resources, but sometimes has a pedagogical rationale, including the reinforcement of collaborative work and the exchange of as many ideas between students as possible (Loveless, 2003:117). Lindberg and Sahlin (2011) indicated the importance of teachers being confident about implementing ICT in their teaching practice pedagogically.

Implementation of ICT in the teaching and learning process also promotes logical thinking, self-learning, collaborative projects, and experiential learning styles amongst students (Kollias and Kikis, 2005:55). Wong et al. (2008:250) also pointed out that the term 'pedagogical innovation' focuses on joint ICT-based student projects to solve real problems. Similarly, Younie and Leask (2013b:104) argued that

Technology can offer alternative formats and approaches to teaching and learning that go beyond routine classroom activities. It has the potential to change pedagogy, to transcend the instructional paradigm and move outside a transmission model of learning. Technology can be a catalyst for changing the role of teachers and learners; it can be used to instigate interaction (talk), collaboration (shared outcomes), higher-order skills (problem-solving) and support creativity.

Each pupil responds differently to the use of technology, so it is important that teachers take into account the differences in individual capacities among students in learning activities that involve the use of technology (Cox, 1999). It seems that collaborative work among students is useful in this respect. Technology supports learners in constructing knowledge from a variety of sources of information and experiences. Therefore, teachers not only need to understand the techniques which enable access to sources of information and how to use them, but also to understand the teaching strategies that make up the different learning experiences with these sources, including support and collaborative teamwork (Loveless et al., 2001).

Furthermore, the integration of ICT into the teaching and learning process can lead to dissolving the 'spatial and temporal boundaries' of normal classrooms (Lawson and Comber, 2000:427). The new role of the teacher when using technology includes '"reorganization" of the classroom, making it easier to extend teaching and learning outside the school context' (Cole and Griffin, 1987:45, cited in Loveless, 2003:124-125). The integration of Web-based technology into the curriculum contributes to the expansion of the role of the teacher to include spaces outside the classroom and the school. In other words, the temporal and spatial boundaries between learning at school and learning at home begin to recede and thaw to become learning in an ongoing process, which achieves the concept of inventiveness. Thus, distance learning can occur through virtual learning spaces across the Web, which include e-mail, discussion fora strategies, and videoconferencing. The teaching skills that teachers use face to face with their students should be developed and re-translated through a virtual environment in which traditional body language is absent, such as through the use of tone of voice and facial expression (Selinger, 2001b:91). In addition, teachers may need to change their views on pedagogy due to the nature of e-cooperation, which is not always among learners and teachers in schools, but can also take place between students and their peers from other schools or between students and other teachers

outside the school and classroom context (ibid:91-92). Therefore, teachers need to adopt new strategies in order to enhance students' learning from others outside the classroom environment (Loveless et al., 2001).

2.6.2 Students' learning practice and ICT

There is clear evidence from studies in the field of technological education indicating that the most important factors that contribute to changing the beliefs and behaviour of students during the learning process using technology are as follows: strengthening the sense of accomplishment felt when technology is used in the learning process; supporting independent learning among students through facilitating self-learning by technology; the contribution of technology through an increase in the enjoyment of students in the learning process; developing students' awareness of the benefits of the educational process; enhancing students' self-confidence; and increasing students' commitment to the performance of learning tasks (Cox, 1999:33). Technology also contributes to the provision of alternative sources of knowledge and information provided by the teacher. This will reduce the traditional dependence of students on the teacher in the classroom, enabling students to obtain greater autonomy during the learning process. This gives students an active role in learning, and will 'prevent teaching from being construed by teachers as a technical procedure of transmitting knowledge to passive learners' (Davis et al., 1997:15).

The most important features of technological support for the learning process include the confidence of students in their learning practice, their independence from the teacher, and being free to choose sources of knowledge in the exercise of their learning tasks (Loveless, 2003:116). Hence, it is no longer necessary for the interaction between teacher and student to be limited to the classroom and the timetable of the school (Loveless et al., 2001).

Internet-based education seems to be a bridge between the learning culture in the school context and the learning culture of the wider community around the student (Selinger, 2001). For example, learning platforms (educational portals) can play an important role in allowing students to take responsibility for their own learning. This

has great advantages, as the learner is able to work steadily at his or her own level (Wheeler, 2001), and there is a greater amount of time in which to improve academic performance as the portal can be accessed outside the classroom. In other words, the use of a portal has the aim of changing the learning process from being teacher- to learner-centred. Learners appreciate the availability of a large number of resources that can support and improve their level (Levy, 2002).

Therefore, easy access to Web-based resources (via an educational portal) is useful. Recent research has indicated that learning through online discussions, which is a feature of an educational portal, promotes students' critical thinking and knowledge. As students work collaboratively, this provides a way of learning and has positive effects, such as enhancing the problem-solving skills of the students (Wang, 2008). Interactivity creates a stimulating environment that keeps students motivated, as the portal is believed to be more efficient in terms of facilitating students with skills at a faster pace (Jethro et al., 2012). Interactivity is a fundamental feature present within an educational portal.

As students adopt a positive attitude towards e-learning, they tend to build 'strong acceptance, commitment and potential for lasting change' (Lim, 2007:113), therefore leading to more effective Web-based learning (e.g., a portal), which has a noticeable effect on performance, academic achievement, and learners' satisfaction (Katz, 2002, cited in Maldonado et al., 2011). Maldonado et al. (2011) indicated that as a greater number of students use educational portals, there is a higher influence towards motivation for e-learning. They argued that although gender differences amongst students were thought to influence the use of educational portals, a study conducted in Peru found that male and female users could be equally motivated towards using them. However, the previous result is specific; this result was only found in Peru and in other regions there is shown to be gender imbalance.

2.6.3 Curricula and ICT

Changes to a curriculum to fit technological innovation in pedagogical practice should be dependent on pedagogical thinking rather that the technological aspects (Bruntlett,

2001:159). Technological innovation in school education requires reorganization of the curriculum through projects that link topics across school subjects, in order to contribute to improving the skills and knowledge of students (Davis, 2001:44). Schwab (1982) argued that there is a false belief that knowledge is a fixed, non-personal phenomenon, while the true nature of knowledge is that it 'is revisionary, creative, personal and pluralistic' (Schwab, 1982, cited in Loveless et al., 2001:74). There is significant difficulty in changing the national curriculum, as it is, in several educational systems, the main source of knowledge. For instance, Somekh (2007:30) argued that

> The curriculum has traditionally embodied knowledge that is not absolutely current. If a curriculum is locally determined it can be frequently refreshed, but by its very nature a national curriculum, such as the one introduced in England after the Education Reform Act of 1988, is established on a relatively long-term basis and difficult to change.

Consequently, traditional pedagogy focuses on the final form of a written text, image or sound, while the new pedagogy, through technological innovation, allows improvements to types of products of knowledge as desired by the users: the students and teachers (Loveless et al., 2001: 74-75). Currently, commercial educational service providers offer new forms of teaching and learning sources that go beyond the old curriculum, such as Anglia Interactive, where the digital resources are produced in an integrated learning environment that enhances the learning process (Bruntlett, 2001). Likewise, Younie and Leask (2013b:104) acknowledged that technological innovation assists students in creating inventive products of knowledge according to their personality in various formats, including written text, images or sound. Web-based resources may be regarded as an alternative to textbooks but are, however, more stimulating. They are much more flexible in terms of the level of the text, thereby allowing the teacher to select the 'right' text depending on the level of each student (Uibu and Kikas, 2008). Moreover, learning platforms enable teachers and students to upload or download learning resources through systems such as the LMS, wiki pages, or discussion fora. Hence, the portal forms a rich source of information related to the various curricula (Wheeler, 2001).

In terms of the potential benefit of a portal in supporting the curriculum, Jewitt et al. (2011:340-341) found that

> Teachers used the LP as a "one-stop shop" to easily gather, organise, and manage learning resources …. The LP also provided a means to manage, access, and use multiple resources within lessons … The LP also provided teachers with links to software applications for creating online materials.

Furthermore, Jewitt et al. (2010) showed that the major benefits of a portal for a curriculum include the following:

- Improving the quality and quantity of learning resources for students.

- Enhancing teachers' abilities to provide students with extra materials to support the curriculum in various formats, including digital forms, video recordings and audio clips.

- Supporting student access to the curriculum in an after-school context.

- Stimulating cross-curricular activities.

- Promoting extra-curricular activities, such as clubs for journalism or sport.

In brief, ICT integration into the teaching and learning process in terms of school curricula has four main factors: curriculum objectives should address the essential needs of ICT changes; school curricula materials should be broadened; curricular content should not cover diverse topics but should be reintroduced in integrated approaches; and curriculum subjects should be connected to genuine problems in students' real lives (Voogt and Odenthal, 1999, cited in Voogt and Pelgrum, 2003:83). In addition, the Qualifications and Curriculum Authority (QCA) (2009:8) in the UK has indicated the importance of the integration of ICT for cross-curricular projects.

2.6.4 Students' assessment through/with ICT

Retaining traditional goals and practices to assess students' learning processes, particularly national examinations for subjects as the basis for measuring student academic abilities, is considered an obstacle to the achievement of technological innovation in education (Somekh, 2007:42-43). Issues relating to the assessment of learning tasks carried out with technology require the application of a number of basic principles in terms of changing assessment approaches. The first principle is to link assessment with the goals of the curriculum (for all school subjects); the second is choosing a form of assessment that is proportional with the development of new

pedagogical practice; the third is the capacity of the assessment to give a clear picture of the evolution of the learning process of students; and the fourth principle is to enable students to engage in the assessment and for it not to be confined to the teacher (Pachler and Field, 1997:206, cited in Pachler and Byrom, 1999:126).

Technological innovation in pedagogical practice calls for the development of traditional assessment tools. For example, Somekh (2007:42) confirmed that the success of technological innovation in pedagogy requires linking changes in the pedagogical practice of the innovation with the system of students' assessment. The integration of ICT into the assessment process has great potential for common forms of formative assessment, which include 'portfolio assessment, self-assessment, peer assessment and authentic assessment' (Cohen et al., 2004:75).

Furthermore, UNESCO (2002:25-26) claimed that effective methods for assessing students' educational progress are compatible with ICT pedagogical practice, as well as reflecting the integration of ICT in curricula. Moreover, the integration of ICT into assessment systems in schools offers a digital alternative for project assessment (coursework), and is aimed at adopting ICT-based assessment techniques (Mioduser et al., 2003:29,34), such as e-mail, discussion fora and Internet chat rooms (Finger and Jamieson-Proctor, 2009:70-71). Learning skills acquired by students through technological innovation in education, such as problem-solving and critical thinking skills, which cannot be measured by traditional assessment methods, have had an inhibitory role for teachers using technology across school subjects, since the use of technology does not lead to providing rewards for students in terms of improving their educational attainment levels. This negative impact seems to increase when assessing the technology skills of students separately from educational practice across school curricula (Somekh, 2007:43). An assessment system that uses technology requires the evaluation of students' 'social development' and, in particular, their ability to work collaboratively and cooperatively with other students (Younie and Leask, 2013b:158).

Computer-based tests might be more convenient to conduct through a learning portal, as less paperwork is involved and marking can be entered into a database more readily. However, putting a great amount of effort into simply changing paper-based tests into computer-based ones without changing the assessment criteria and frameworks will

not result in a great deal of improvement (McFarlane, 2002, cited in Krumsvik, 2006). A portal allows for the assessment of each student, as work can be set and tracked online by both the teacher and the student (Wheeler, 2001). Further, it seems that e-portfolio tools and 'multimodal forms' have substantial potential for students' assessment in the context of the implementation of learning platforms into the learning process in schools (Younie and Leask, 2013b:158).

2.7 The dimension of parents' involvement

Numerous studies reveal the essential and crucial role of the home/parents concerning students' use of ICT in learning, with two issues of particular relevance to the present study: the role of parents concerning the motivation of students towards ICT use, and the availability of PCs and the Internet in students' homes. These two issues are discussed below.

2.7.1 Students' motivation by their parents

Vekiri's (2010) study took place in a certain context of middle-school information science in Greece through a self-reporting questionnaire responded to by 301 male and female students based on value-expectancy theory. This was carried out to emphasize the strong role of parents and the home use of ICT in fostering favourable attitudes and the fervent beliefs of the students towards ICT use. She concluded that students who thought that their parents encouraged them to improve their knowledge and skills in ICT showed high self-efficiency, strong motivation and positive beliefs towards the use of ICT. Furthermore, McGarr and Kearney (2009) found that the rapid spread of ICT among students outside school greatly contributed to producing more significant and marked change regarding the use of ICT in schools compared with the ICT initiatives at the national level in Ireland. Furthermore, Jewitt et al. (2011) emphasized that the usefulness of portals mainly lies in supporting and strengthening the relationship between home and school.

2.7.2 The availability of PCs and the Internet in students' homes

Qablan et al. (2009:2) in their study, which included a number of science students in one girls' school in Jordan and based on interviews and classroom observations, considered that the inability of parents to buy PCs or provide access to the Internet hindered students' use of ICT. They found only 11 out of the 22 students who were interviewed had computers at home and only three of them were able to access the Internet there. The majority of them attributed this to their parents' understanding and perspective about the use of PCs and the Internet, whereby their parents believed that these tools would divert their children's attention and focus away from learning, in addition to the fear that their children would use the Internet to visit inappropriate websites. Jewitt et al. (2010), in their study of the use of e-learning portals in 12 schools (six primary and six secondary) in the UK, demonstrated that access to basic ICT in the students' residences (PCs and an Internet broadband service) had become more prevalent. However, there were a few houses where PCs and Internet access were not available. This has been addressed through a range of technology initiatives between schools and home, mainly based on the rental or lending of ICT needed for the use of portals, including equipment, software and ICT training for students and parents. Moreover, in Belgium, the federal government has launched several initiatives to promote and encourage the use of computers in homes to support the integration of ICT in education, including the 'Internet for all' and 'Start to surf' initiatives, by which families of students can obtain PCs and Internet network subscriptions at discounted prices (Pynoo et al., 2012:1335).

2.8 Summary

This chapter has highlighted how technological innovation is intricately linked with other educational innovations at the education system level. Therefore, the operational factors affecting the success of the ICT implementation process in school education are highly complex, interdependent, and interrelated. This indicates that the relation between these factors is not linear. In addition, through conducting an in-depth review

of existing relevant studies on ICT implementation in school education, there is relatively little attention focused on students' perspectives in relation to the factors influencing the use of technology in education. Furthermore, reviewing the related literature about using educational technology in schools points to a limited number of studies concerning the use of educational portals or learning platforms in schools. Finally, 11 key issues that constitute the factors influencing the use of educational portals in schools included in the initial theoretical framework that has been built in this chapter are shown in Figure 2.1.

Drawing upon the relevant studies, the 11 key issues referred to above have been categorized under four major dimensions, as follows: *technological*, *organisational*, *pedagogical*, and that of the *involvement of students' parents*. The technological dimension includes ICT infrastructure and designing the portal website. The organisational dimension comprises leadership, policies, and the continuous professional development of teachers. The pedagogical dimension consists of the curriculum, teaching practice, the practice of students, and the assessment of students. Finally, the dimension of the involvement of students' parents takes account of ICT availability in students' homes and parents' motivation towards their children's use of that technology. Thus, the issues related to the implementation of educational portals are to some extent similar to those related to ICT implementation in general. However, differences arise within the technological aspect, by which the portal requires systems that are built on the Web, as the portal is an advanced form of ICT. Moreover, it seems that the deep involvement of parents in any project concerning the implementation of portals or learning platforms has become more important in comparison with parents' involvement in ICT use in general.
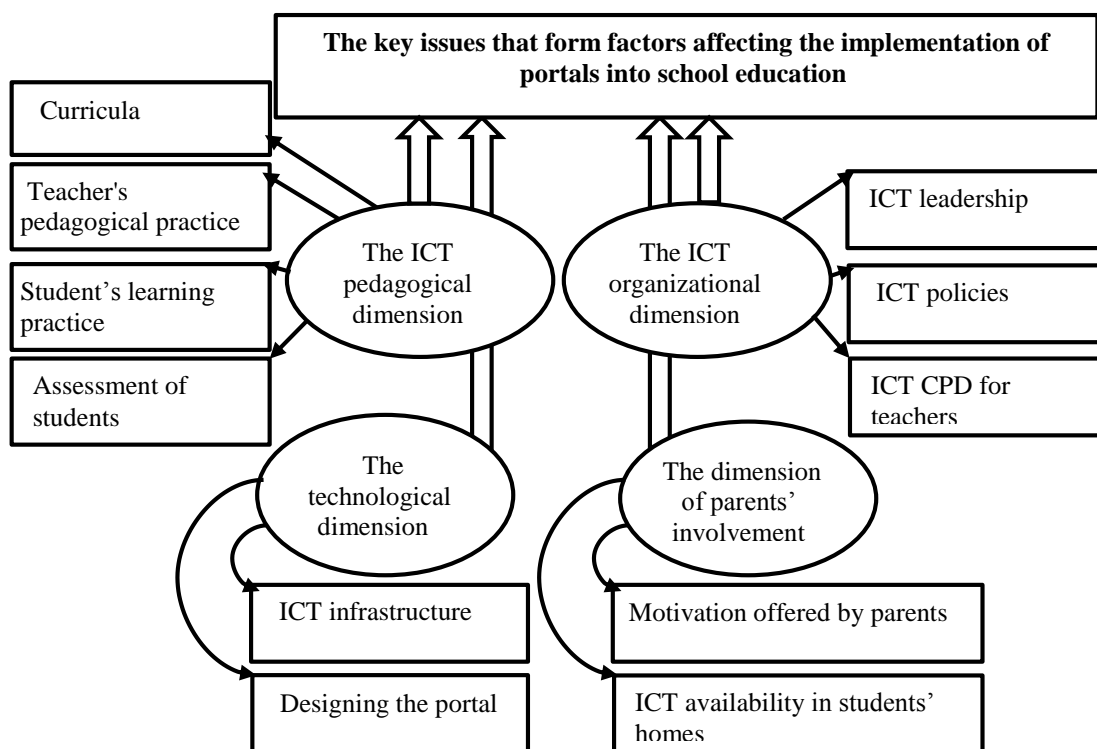
Figure 2.1: The initial framework of the implementation of portals

Chapter Three: Research Methodology

3.1 Introduction

In this chapter, the main methodological issues regarding the current study are discussed under the following eight subheadings:

- The main methodological paradigms used in this study, including the research strategy and the ontological and epistemological orientations.
- The research design.
- The research strategies.
- Access to the research settings.
- Data collection.
- The main tools used in the data analysis.
- Trustworthiness.
- Ethical considerations.

3.2 Methodological paradigms

Paradigms refer to a set of beliefs or values amongst a research community that determines how researchers conduct their study (Coleman et al., 1997). There is a distinct ontology and epistemology for qualitative and quantitative paradigms, respectively. Ontology refers to the way of viewing the world, whereas epistemology refers to the different beliefs of what knowledge is (Denzin, 1994:4). The qualitative strategy is based on the ontological perspective of constructionism, which signifies that social phenomena have manifold realities (Carpenter, 2003:9). In more detail, constructionism emphasizes that a sense of the realities of social phenomena is constantly dependent on the social actors involved, as a social phenomenon undergoes processes that are subject to constant revision (Bryman and Bell, 2003:23). In other words, the ontological orientation of constructionism focuses on how people interpret

the real world of their social phenomenon through deep meanings, words, and human interactions (Franklin, 1997:248) and is thus dependent on a relativist rather than a realist reality (Pring, 2000:47).

The epistemological position of a qualitative strategy is interpretivism, which denotes a sound grasp of the subjective judgements of social activities that are undertaken in social phenomena (Bryman, 2004:13). The interpretive epistemology focuses only on organisations, including educational institutions (such as schools), as subjective phenomena which emerge from the activities of their people (Magalhães, 2004:10). However, an understanding of human activities requires a researcher to interpret the meanings that represent such activities (Jacobs, 2003:43). Hence, the epistemological orientation of interpretivism requires the researcher to have a deep involvement in the social realities of his/her field of study (Carson et al., 2001:153). In other words, the knowledge (evidence) of any phenomenon is mainly explored through the social interaction process between a researcher and the individuals involved in that phenomenon (Carpenter, 2003:9).

A quantitative strategy, on the other hand, is based on the ontological perspective of objectivism, which implies that social phenomena are independent of social actors (Bryman, 2004). In other words, realism is the philosophical basis of objectivism. Simultaneously, objectivism tends to discover the universal laws of society (Cohen et al., 2007). The epistemological position of the quantitative strategy is positivism, which promotes the application of the methods of natural sciences in the study of social reality. Positivism adopts the quantitative approach in order to understand social phenomena (Middlewood et al., 2005). The quantitative strategy uses deductive reasoning towards the interpretation of social phenomena (Bryman, 2004).

Combining qualitative and quantitative methods in one study is considered by some researchers, such as Tashakkori and Teddlie (2003), to be an impossible task because they feel it will lead to a clear violation of the philosophical principles or methodological paradigms of these two research methods (Morgan, 2007). However, there is a strong tendency in literature related to the research methods in the social sciences that the combination of qualitative and quantitative approaches represents in effect a third research framework, known as the mixed methods. The mixed research approach is not intended to be an alternative to the quantitative or qualitative method,

but focuses on an exploitation of the strengths and avoids the weak elements of both the quantitative and qualitative approaches (Johnson and Onwuegbuzie, 2004). For instance, Johnson et al. (2007:129) defined mixed methods as follows:

> Mixed methods research is an intellectual and practical synthesis based on qualitative and quantitative research; it is the third methodological or research paradigm (along with qualitative and quantitative research). It recognizes the importance of traditional quantitative and qualitative research but also offers a powerful third paradigm choice that often will provide the most informative, complete, balanced, and useful research results.

Mixed methods, whether used sequentially or simultaneously, are significant in determining the methodological paradigm of the mixed methods model employed for a particular piece of research (Johnson and Onwuegbuzie, 2004). In this current study, the qualitative method is applied first and prevails in this study, and is then followed by the use of the quantitative method. In other words, this study follows the 'qualitative dominant' type of mixed method (Johnson et al., 2007:124). The main reason for this is that in the KSA the integration of ICT into the teaching and learning process through the Portal is in its initial stage of development, and there is also very little knowledge available about the implementation of ICT into Saudi schools generally (Oyaid, 2009).

3.3 Research design

In the current study, a mixed-methods approach was adopted, in which the methods were predetermined as opposed to emerging as the study proceeded. The findings of the qualitative element of the study were used to develop the quantitative method (Creswell and Plano Clark, 2010). Johnson et al. (2007:129) concluded that mixed-methods research 'often will provide the most informative, complete, balanced, and useful research results'. Using a mixed-methods approach is useful, as different methods serve different functions. This idea of varying the data collection method ensures that the researcher has covered the most important aspects of the study. Simultaneously, using the mixed-methods approach increases the likelihood of

unanticipated results arising (Saunders et al., 2009). Sachdeva (2009:14) has pointed out the importance of using qualitative alongside quantitative methods in order to achieve a full understanding of the situation. He stated that

> although the results of qualitative research can give some indication as to "why", "how" and "when" something occurs, it cannot tell us "how often" or "how many". Sachdeva (2009:14)

There was a general tendency to use a mixed-methods approach in designing the majority of the previous research studies conducted in relation to ICT integration in an educational context.

Fogelman and Comber (2007:125) have described the survey as the 'most frequently used research method' in the social sciences, which is often combined with another research method. For instance, Tearle's (2004) study of the implementation of ICT in a school context used a questionnaire as a quantitative strategy followed by interviews as a qualitative strategy. The quantitative approach allow the researcher of ICT implementation to have a wide view of the attitudes and practice of the participants with the questionnaire providing descriptive statistics, while the qualitative approach allows the expansion and further exploration of issues that arise from these analyses. Tearle (2004) indicated that studying ICT implementation in schools might lead to using mixed methods in order to identify any relationships between practical models of ICT implementation and theoretical frameworks for ICT implementation.

Furthermore, a study conducted by Nasser et al. (2011) to investigate the usage of the Qatari Educational Portal, Knowledge-Net (K-Net), also used a mixed-methods approach. The survey was used as a quantitative strategy, delivered through the K-Net to be completed by students and teachers at 37 independent schools. The survey investigated the usage of the K-Net Portal and assisted in the selection of the five schools at which the semi-structured interviews were conducted. The purpose of using both qualitative and quantitative methods was to reveal any contradictions within the findings of the study. Moreover, in a study conducted by Uibu and Kikas (2008) related to using ICT in the teaching and learning process from the teachers' perspective, it was concluded that applying a combination of qualitative and quantitative approaches was crucial to the research design.

Creswell and Plano Clark (2010) declared six mixed-methods designs: the convergent parallel design; the explanatory sequential design; the exploratory sequential design; the embedded design; the transformative design; and the multi-phase design. The current study followed an exploratory sequential design, in which the quantitative data collection and analysis built upon those of the qualitative approach (see Figure 3.1).

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┌─────────────────────────────────────────┐
│   The initial theoretical framework      │
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┌─────────────────────────────────────────┐
│           Case study strategy            │
│     (Implementation of the Portal in     │
│          selected four schools)          │
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                    ║
┌─────────────────────────────────────────┐
│   Qualitative approach (Documentations & │
│                Interviews)               │
└─────────────────────────────────────────┘
                    ║
┌─────────────────────────────────────────┐
│           Qualitative findings           │
└─────────────────────────────────────────┘
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│      Quantitative strategy (Survey)      │
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│   Quantitative approach (Questionnaire)  │
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│          Quantitative findings           │
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┌─────────────────────────────────────────┐
│          Synthesising all findings       │
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│    A model for implementation of the     │
│                 Portal                   │
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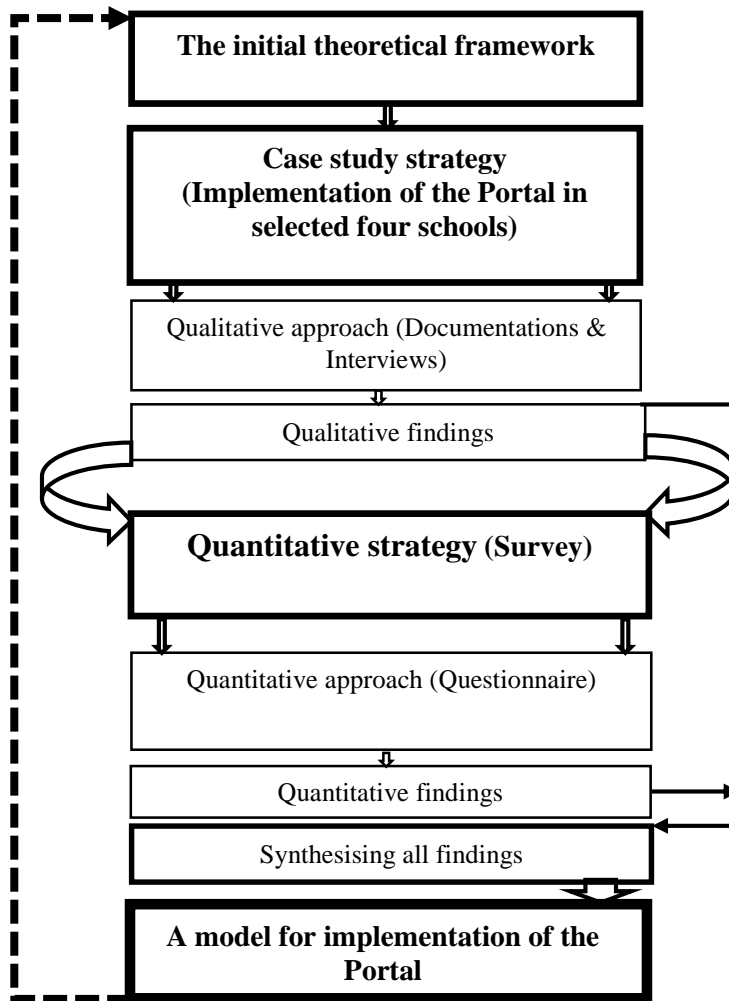
Figure 3.1 Research design of the present study

3.3.1 Exploratory sequential mixed methods

Mixed research methods take two forms: the first is the parallel form, in which quantitative and qualitative research methods are used at the same time; the second approach involves sequential research methods, that is where either the qualitative

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research method is applied first, followed by the quantitative phase, or vice versa (Saunders et al., 2012). The exploratory sequential mixed methods used in the current study (see Figure 3.1) was designed so that it gave priority to the qualitative approach in the first phase, followed by the quantitative approach in the second phase (Creswell and Plano Clark, 2011). However, the analysis of the data of each phase was initially conducted separately, whereby the qualitative data were analysed using qualitative (interpretive) procedures, while the quantitative data analysis was done through statistical procedures (Saunders et al., 2012).

The philosophical assumptions underlying the study began with constructivist principles during the execution of the qualitative phase with a view to evaluate the multiple perspectives of the study sample in detail and establish a deeper understanding of the phenomenon under study. A positivist approach informed the quantitative research phase, which was intended to evaluate statistically participants' responses in terms of the variables that resulted from the qualitative data, , as well as measuring the relations between the variables (Creswell and Plano Clark, 2011). Nevertheless, despite this type of research method being appropriate for explaining and interpreting the relations between the variables in the study, the focus for this type of research method is to explore the depth of the phenomenon under study (Creswell, 2003).

Four basic sequential steps can be differentiated during the implementation of exploratory mixed methods in the present study. The first step was qualitative data collection and analysis to explore the phenomenon of the Portal through a small purposive sample. The second step was the development of a tool to collect quantitative data based on the results of the qualitative data phase. This tool aimed to identify the quantitative variables in the study, as well as acting as a mediator between the two consecutive phases. The third step was applied to the study tool for the collection of quantitative data with a larger sample of participants. Finally, the fourth stage involved interpretation of the quantitative results so that they could be disseminated or used for expansion of the initial qualitative results (Creswell and Plano Clark, 2011). Thus, starting with a qualitative research approach aimed to explore the implementation of the Portal and then to follow up consideration of the phenomenon of the Portal by using the method of quantitative research for a larger sample. This

enables the researcher to generalize the results to the study population or the expansion of the results based on qualitative data (Creswell, 2003).

The exploratory sequential mixed method is appropriate for phenomena where studies are lacking in the related literature (Afshari et al., 2009). The educational portals that are used in schools are relatively a new phenomenon, hence the small number of studies in education related to this subject, as well as on the Portal of the Tatweer Project in particular as it is applied for the first time in the KSA. The current study is the first piece of research to have dealt with this project until now. This type of mixed method research has been used where no agreed measurement variables exist in the literature relating to the implementation of ICT in schools which can be used for quantitative studies (Vanderlinde and van Braak, 2010). There is also a lack of theorizing in the field of technological innovation in education (Tearle, 2004), in addition to the consideration that factors associated with the phenomenon of technological innovation in education are still in the exploration phase (Tondeur et al., 2009). The phenomenon of the use of ICT varies from school to school; it also varies within the same school from one department to another (Younie, 2007). Finally, the phenomenon of the Portal requires studying in depth with the measurement of the spread of the phenomenon (i.e., acceptance within the study population) (Creswell and Plano Clark, 2011).

3.4 Research strategies

There are two research strategies in this study: the case study strategy and the survey strategy were implemented through two main stages. The case study strategy was used in the first stage. In more detail, a deep exploration of social phenomena such as schools needs a case study approach (McDuffie and Scruggs, 2008 cited in Mertens, 2010:233) because the case study design broadens comprehensive knowledge about any social phenomenon (Willis, 2008:213). Moreover, the case study strategy has a great ability to study social phenomena based on real-life events through the use of qualitative methods, in particular via the use of an interview (Yin, 2006). The case study design for studying schools can be produced as a single case (e.g., a school as

one site) or a multi-case study design (e.g., multiple sites of schools). Nevertheless, studies regarding school innovations such as the integration of ICT into the teaching and learning process through an educational portal usually use multi-site case studies in order to build a model specializing in the implementation of the portal (Yin, 2003).

In other words, a case study strategy usually passes through a two-stage process (Hartley, 2004:331-332). The first stage involves setting an initial framework for the social phenomenon under investigation. This framework is aimed at providing the researcher with extensive literature and core concepts related to the case study, as well as avoiding a narrative structure in the case study. The framework should forge links between current theories and data collection on the one hand, and between data analysis and theories on the other, which means the researcher should deal with existing theories and the research method concurrently rather than sequentially. The second stage involves utilizing multiple cases or multiple sites in order to increase the external validity of the findings of the research by using cross-checking and valid comparison.

In the current study, an initial conceptual framework was first established according to the body of literature on the integration of ICT into the teaching and learning process, particularly through using educational portals (Figure 2.1). However, the initial framework, as discussed in the literature review chapter, was used initially to impose the research instrument design of the qualitative approach without limiting the breadth of its vision during all stages of the research (Tearle, 2004:332-333). The main outcome of this case study, which is a theoretical model for the successful implementation of the Portal in Chapter 7 (discussion), has a strong link with the initial conceptual framework. Secondly, this study used multiple sites (four schools that had implemented the Portal). In more detail, this study used the four best schools that had received awards for their expert use of the Portal. The Portal is a relatively new project, involving the application of ICT by both the students and teachers. It is not a compulsory task to be performed; therefore, it was a target of the current study to select the members of a school who are expert in the Portal usage. This was achieved by

conducting a qualitative approach to uncovering the advanced uses of the Portal performed by either the teachers or the students.

In the second stage, the survey strategy was built upon the findings of the qualitative approach. In this case, the survey was designed according to the results obtained by the qualitative method. The survey was used to answer the objectives of this study, where the case study strategy had small numbers of participants and was not able to make valid generalizations about the perspective of teachers and students regarding the implementation of the Portal (Bryman, 2004). Fogelman and Comber (2007:128) indicated that:

> More specifically, survey is the most advisable methodology where the research objective is to gather general information about attitudes, opinions or characteristics...and where the researcher wishes to explore quantifiable differences between groups or relationships between variables.

In more detail, the survey was used to obtain data related to teachers' and students' perspectives concerning the acceptance of the Portal, potential benefits of the Portal, factors influencing the implementation of the Portal, and suggestions for successful implementation of the Portal. Furthermore, the survey was applied to identify differences amongst teachers as well as among students in terms of the Portal based on their personal characteristics.

3.5 Access to the research setting

Access to the research setting occurred in three stages: visiting the research field during the summer of 2011 in order to understand ICT integration in Tatweer schools and refine the plans for my field study (Yin, 2003). Following advice from one of the supervisors of the Portal Project, who stressed the importance of gaining the perspective of the Ministry's Educational Projects Manager first, a meeting was conducted with the Manager of the Public Administration of Educational Projects in the Saudi Ministry of Education. The meeting shed light on the Portal Project, which was set up by the Tatweer Project. The Portal was activated in the second term of the

2010 academic year in the experimental stage within three educational administrative districts - Riyadh (four schools), Asir (two schools) and al-Zulfi (two schools) - in order to support the integration of ICT into the teaching and learning process through the Portal.

The Tatweer Project distributed awards dedicated to the best usage of the Portal on four different levels: educational administrative district, schools, teachers and students in the year 2011. The criteria of these awards were laid on the basis of the frequency of the usage of the Portal by the *students* in terms of taking part in activities, including the following: participating in discussion fora, completing homework through the Portal and accessing educational resources; and the frequency of the usage of the Portal by the school *teachers* in terms of performing activities within the Portal, which included uploading educational resources, constant availability within the Portal, and participation in the discussion fora. The educational administrative district in Riyadh scored the highest for the four different levels, and hence received the award at the educational administrative district level. Further, the best school, teachers and students were from the educational administrative district of Riyadh.

In the process of selecting the schools for the case study, the above criteria were followed. Therefore, a decision was made to involve the four schools within the Riyadh District, which are as follows: the Prince Abdulmajeed Secondary School (School 1) for boys; the Eighty-First Secondary School (School 2) for girls; the Fiftieth Secondary School (School 3) for girls; and the Third Intermediate School for Memorizing the Quran (School 4) for girls. Official letters from the Saudi Ministry of Education were sent to each of the four schools to facilitate my access and cooperation concerning this research.

The second stage occurred during the field study, lasting from October 2011 until January 2012. The qualitative method was conducted during this period, after which the findings were analysed in order to launch the quantitative method. The research field was accessed during the third stage from October to November 2012, during which time the final questionnaire was distributed to the participants.

3.6 Data collection

3.6.1 Documentation

The main types of documents used in this study include the official publications, as well as official information, on the Tatweer Project website and its programmes in terms of the implementation of ICT into the Saudi K-12 educational system, including using the Portal. Further, Saudi national development plans concerning education were reviewed and the new Saudi educational strategy was analysed. The main advantages of the use of documentary evidence are: (1) to enable the researcher to collect the information from the words of the participant; (2) to provide the researcher with unrestricted access to the case-site study at any time; and (3) to capture data which may be difficult to gather by other data collection techniques (Fitzgerald, 2007:282-283).

3.6.2 Semi-structured interview

The interview is the main data collection tool in regard to the qualitative approach (Yin, 2003). Semi-structured interviews allow for a rich source of data, as recording and observing the interviewees' responses to a certain question allows for a greater understanding of their attitudes, perspectives and views in relation to that question. As the semi-structured interview offers greater flexibility to the researcher, this allows him/her to investigate further the interviewees' experience; in this case, the usage of the Portal (Uibu and Krista, 2008).

The interview offers the researcher a greater insight into the processes regarding the integration of ICT into schools (Punch, 2009:144). Hence, the data derived from the qualitative interviews, in particular the semi-structured format, have the capacity to reveal hitherto unthought-of elements in terms of the implementation of the Portal (Cohen et al., 2007:357). The face-to-face semi-structured interview is often used in educational studies for many reasons. Firstly, a semi-structured interview allows

considerable depth to be fulfilled by offering the interviewer an opportunity for probing and expanding upon the responses from respondents (Hitchcock and Hughes, 1995:157). In addition, the semi-structured interview technique avoids the disadvantage of the unstructured interview technique of collecting unnecessary information from the participants (Bryman, 2004). Furthermore, the interview data were used to design detailed questionnaires on the integration of ICT into the teaching and learning process through the Portal, which is still at the experimental stage.

▪ **Piloting the interviews with teachers, senior managers and students**

The number of participants can form a key limitation to a piece of research. As Uibu and Krista (2008) suggested, interviewing only five teachers has meant the results are not sufficiently representative of the population, as the sample was small and not diverse. Therefore, in the current study, a minimum of four teachers and one senior manager were nominated to be interviewed from each of the four selected schools. Hence, in this study, the teachers who received awards from the Tatweer Project or were nominated for these awards in terms of the above criteria were selected to be interviewed from each school (there were four teachers from each school who were chosen by the Tatweer Project to compete for these awards). In other words, the process by which participants were selected was in terms of the highest scores for using the Portal in the education process in every school. The targeted number of interviews was for 16 teachers, four from each of the four selected schools, as indicated above. However, for reasons described below interviews were conducted with 11 teachers, as follows: four male teachers from School 1, and seven female teachers from three other schools for girls (three female teachers were interviewed in School 2; two female teachers were interviewed in School 3; and two female teachers were interviewed in School 3). The main reasons for decreasing the number to 11 teachers were as follows: first, the sickness of one female teacher in School 2; the sickness of a female teacher in School 3 and another who was transferred to another school; and in School 4 one teacher was transferred to another school and another chose not to take part. Nonetheless, analysis of the data showed a close convergence in many aspects related to the teachers' answers in the four schools, suggesting that 11 was a sufficiently large sample. Moreover, the teachers' subjects varied. Such variety is important to give a more comprehensive picture of applying technology in the process

of teaching and learning through the Portal. These subjects were biology, chemistry, physics, mathematics, religious studies, Arabic and English.

Three senior managers who were involved voluntarily in the leadership of the Portal were selected to be interviewed. They were in varying leadership positions within the Portal Project. These three interviews with the senior managers were conducted as follows: Interview 1 was conducted with the female ICT Coordinator Supervisor at the Ministry of Education. She is one of the Portal Project leaders. She holds a BSc in Science, a Diploma in Education, and a Diploma in Computer Science. Interview 2 was held with a female principal of one of the four schools that had implemented the Portal. She holds a BA in Arabic Literature and has attended a month-long training course in computing, including the Portal training course. Interview 3: this was conducted with a male deputy head of one of the four schools and responsible for leading the Portal Project. He has attended the following training courses: a Diploma in Data Processing; a one-week training course in using smart boards; and a one-week training course in using the Portal. In terms of interviews with the students, four students were interviewed in each school as a focus group. They were selected on the basis of the criteria of the Tatweer Project awards (the Tatweer Project chose four students from each school to compete for the awards), based on the usage of the portal. Hence, the sample included students who used the Portal frequently and had experience in its usage.

▪ Designing the interviews with teachers, senior managers and students
The interviews held with teachers, senior managers, and students dealt with three main aspects: ICT integration into the learning and teaching process in Saudi schools that had implemented the Portal; stimuli and hindrances to the integration of ICT into the teaching and learning process through the use of the Portal; and suggestions for successful implementation of the Portal. The interview structure was prepared according to the main research objectives of this study. Hence, the main research objectives of this study were translated into detailed and probing questions. The structure of the interviews with teachers and senior managers was the same (see Appendix 1). However, the interview conducted with the students had a greater focus on the learning process issues (see Appendix 2). In all the interviews the interviewee

was given an opportunity to expand on any issues that were not raised or stressed sufficiently during the interview. The format of the questions was open-ended (Cohen et al., 2007:356). The interviews were conducted in the first language of the respondents, which is Arabic, in order to offer them sufficient opportunity to share their experiences and knowledge with the researcher.

▪ **Administering the interviews**

The responses were not recorded digitally in accordance with a request from all the school principals involved; instead, the interviews were recorded manually on paper. The researcher introduced the study's aims and importance in the educational field to the recipients before moving forward with the questions. On the other hand, the interview conducted with the students took the form of a focus group. The interviews with teachers, senior managers and students followed clear guidelines, which included four aspects. The first was that the interviews with the teachers and senior managers were to be held for a fixed period of time (the interviews lasted for one hour per interviewee; those conducted with the groups of students took 45 minutes, and all took place outside working hours). The second aspect was the exact location of the interview (each interview was carried out at a specific and ideal location in each school with the exception of one teacher who requested that it be conducted outside the premises due to the limited free time he had at school). The third aspect was to present the aims of the interview to the participants. Finally, a key aspect was to present the ethical guidelines to the interviewees. All the respondents were asked individually to grant the researcher their permission to record their interviews on written papers in order to keep an accurate record of the data that would be derived (Yin, 2003). However, the majority declined to grant their permission.

3.6.3 The questionnaires

The questionnaires were designed to be completed within10-15 minutes during the teachers' and the students' free time, for example, in break times (for the teachers) or free periods. The questionnaire could be submitted in hard copy or as an electronic copy via email. The questionnaires were distributed in Arabic after translation from

English. This was more appropriate, as Arabic is the participants' first language. The structure of the questionnaire was gradually built in two critical steps. The first step was extracting key themes from the previously conducted interviews and including them in the questionnaire. As Cohen et al. (2007) have stated, a pilot is vital for the reliability of a questionnaire. Accordingly for both questionnaires (one for the students and one for the teachers), an evaluation was made by 11 experts: 10 teachers and one senior manager, who participated in the interview. The experts were given the opportunity to amend the wording used within the questionnaire, so a number of comments were made suggesting rephrasing certain questions due to difficulty or lack of clarity. Other comments were made regarding removing certain vocabulary which was not at a level appropriate for the participants. The second step was to distribute the questionnaire to a sample of 15 teachers and 15 students as a pilot study to assess validity and reliability.

The students' questionnaire was divided into two sections. The first section relates to personal details, including the gender of the participant; whether the participant had taken part in any previous ICT-based training courses; if the recipient owns a laptop or an iPad; the availability of the Internet at home; the various different technologies the students may have used; and, finally, whether the participant had used the Portal. The second section is concerned with the dimensions of the current study. This is then subdivided into a further three sections: the usefulness and acceptance of using the Portal in the learning process; factors that influence using the Portal in the learning process; and suggestions for successful implementation of the Portal. Each subsection consists of a series of statements, which the participant is asked to rate according to a five-point Likert scale. The number of statements (items) in each subsection is 16, 15 and 17, respectively. The items branching under each section of the students' questionnaire greatly emphasize the learning process. At the end of each section, the participant is given the opportunity to add any statements relating to the specified dimension. The analysis of the pilot questionnaire of 15 students showed that the Pearson correlation had a significant value of 0.500 or more for all items in the questionnaire ($p < 0.05$), which was an indicator of the validity of the questionnaire for the students. Further, the Cronbach's alpha scores were above 0.6 for all items in the questionnaire; therefore, the questionnaire for the students demonstrated an acceptable internal consistency (Cronbach's alpha > 0.6) (Fahmi, 2005). This resulted

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in the formation of the final version of the questionnaire for the students (see Appendix 3).

Moreover, the teachers' questionnaire was also divided into two sections. The first section relates to personal details, including the job title of the participant; the age and gender of the participant; the qualification level of the recipient; the number of years in service; whether the participant had taken part in any ICT-based training courses; whether the participant has a laptop or an iPad; the availability of the Internet at home; the various different technologies the recipient may have used; and, finally, whether the participant had used the Portal as well as the frequency of using the Portal. The second section involves the dimensions of the current study, which are subdivided into three further subsections: the usefulness and acceptance of implementing the Portal in the teaching and learning process; factors that influence using the Portal; and suggestions for successful implementation of the Portal into the teaching and learning process. Each subsection consists of a series of statements, which the participant is asked to rate according to a five-point Likert scale. The total number of statements is 58. The items under each of the sections above are more orientated around the learning and teaching process. The participants are then given the opportunity to add any statements related to the specified dimension. The analysis of the pilot questionnaire given to 15 teachers indicated that the Pearson correlation had a significant value of 0.500 or more for all items ($p < 0.05$), which means the questionnaire for the teachers is valid. Further, the Cronbach's alpha scores were above 0.7 for all items; therefore, the questionnaire for the teachers is reliable (Fahmi, 2005). This led to the formation of the final version of the questionnaire for the teachers (see Appendix 4).

▪ **The sample size for the questionnaire**

The Portal project was confined to four schools in the city of Riyadh, as the study was based around this district. The researcher did not have total control of the size of the study population in terms of including other schools. This is one of the main limitations of the study. Hence, the questionnaire was distributed to all the teachers and students in the four selected schools, whether they were regular users of the Portal or otherwise. This allowed for a generalized conclusion of the extent of the importance of Portal usage (Uibu and Kikas, 2008). The questionnaires were distributed to all the teachers

(122) in the four selected schools. The other questionnaire was distributed to 215 students across the three secondary schools. The fourth school (an intermediate-level school) was eliminated due to the findings ofthe pilot questionnaire , as the students were at the intermediate stage of the school year, and they had had profound difficulties with the comprehension of the questionnaire. . The researcher visited the four selected schools in order to create a more stimulating environment in which the majority of the students and teachers could complete the questionnaire.

Moreover, 71 teachers' questionnaires were successfully completed and taken into account. However, 51 were omitted due to inaccuracy or uncompleted surveys. On the other hand, 115 students' questionnaires were completed and submitted successfully; however, 100 questionnaires were excluded due to incompletion, the majority were left blank and others had very few of the questions answered and were not legible for analysis.

3.7 Data analysis

There are two kinds of detailed data - qualitative and quantitative - that are derived from the two data collection techniques in this study. An in-depth analysis of these data was carried out in seven stages (Ary et al., 2009:565). The first stage was to reduce the amount of data. Hence, the qualitative data, which took the form of material from the interviews and documentations, were coded by indexing categories according to key themes raised (data from the interviews were coded using NVivo software), and the quantitative data from the questionnaires were coded using SPSS software. The second stage was the data display, which includes statistical tables and graph forms to present the quantitative data, and rubrics and illustrative quotations in order to present the qualitative data. The third stage was the transformation of some data from a qualitative format to a quantitative one, or vice versa. The fourth stage was to correlate the data, which meant a comparison of the qualitative and quantitative data that were derived from the analysis with the original qualitative and quantitative data in order to check whether they had comparable outcomes. The fifth stage was to consolidate the

qualitative and quantitative data in order to produce new factors or dimensions in terms of the integration of ICT into the teaching and learning process through the Portal. The sixth stage was a comparison of the qualitative and quantitative evidence. The final stage was the integration of the qualitative and quantitative data in order for them to be interpreted as a coherent whole. Within the first and second stages, the analysis of the qualitative and quantitative data was processed separately within two different chapters. However, from the third stage onwards, the analysis of the two types of data was linked within one chapter: the discussion chapter.

In more detail, the analysis of the interview data underwent two stages. In the first stage, the thematic and content analysis approach (Strauss and Corbin, 1998) was used to analyse the interviews with the teachers and senior managers as well as the interviews with students. In this stage, the NVivo software was used to create thematic codes for both the interviews with the teachers and senior managers, and the interviews with the students. The data from the interviews with the teachers and senior managers were broken down into 20 initial thematic codes, and the interviews with the students generated 17 initial thematic codes. In the second stage, the constant comparison approach (Boeije, 2002) was used to refine the thematic codes for all the data from the interviews in accordance with the initial thematic codes in the first stage on the one hand, and the objectives of this study on the other. Finally, the initial thematic codes were reduced to seven thematic codes.

A number of statistical tests were used to process the quantitative data. Pearson's product-moment correlation was used to assess the validity; Cronbach's alpha was used to assess the reliability; and a one-way ANOVA test and a t-test were used to reveal statistically significant differences within the results. Furthermore, a factor analysis test and regression analysis were applied to identify factors affecting the usage of the Portal (see Chapter 5 for more details). Finally, the mean and standard deviation were also calculated (Fahmi, 2005).

3.8 Trustworthiness

In this study, the view of the 'trustworthiness' of the research findings may be assessed against four criteria: credibility (internal validity), transferability (external validity), dependability (reality), and conformability (objectivity) (Bryman, 2004: 273-276). In more detail, the findings were built using detailed description to enhance the external validity of this study. Furthermore, the researcher kept complete written records of all stages of the data collection process on computer in order to ensure the reliability of the research as a whole. Finally, several ethical considerations were taken into account during this research in order to avoid a lack of objectivity. This study also used triangulation methods and techniques in order to increase the internal validity of the research results to reinforce the study's authenticity. Simultaneously, methodological triangulation ensured that any limitations that lay within a particular data collection technique (interview) employed were at least in part compensated for by the strengths of the other (survey) (Almas and Krumsvik, 2008).

As noted above, the questionnaires were also presented to 11 experts during the pilot process. Moreover, Cronbach's alpha was applied to assess the reliability of the statements (items) presented in the three dimensions within both pilot questionnaires (15 teachers and 15 students). After the collection of the data, the reliability was rechecked. There are a number of statements within each questionnaire which carry the same meaning but are, however, delivered in different wording. This assesses the honesty of the participants and enhances the reliability of the statements on the Likert scale. On the other hand, a pilot study was conducted in which 15 teachers and 15 students from the selected schools took part. This was crucial to enhance the validity of the research. The Pearson statistical test showed that the statements in all three dimensions (aspects) within both questionnaires for the teachers and students had values of more than 0.5 and were significant at the 0.05 level.

3.9 Ethical considerations

In this study, great care was taken in order to give the participants opportunities for ensuring the accuracy of the research data (Cohen et al., 2007:70). For instance, the interviewees (teachers, senior managers and students) had 'respondent validation' in that they were given the opportunity to check the data that were derived from their interviews. However, only two teachers checked the validity of their answers: one teacher agreed that the written interview that was conducted with her was an accurate record of the interview, but the other teacher added more information regarding the suggestion of successful implementation of the Portal in her record.

Furthermore, this study avoided four central problems: the risk of harm to any participant, making any progress in the research methods without the necessary permission, intrusion into individual privacy, and deliberate deception (Diener and Grandall, 1978 cited in Bryman, 2004:509).

The researcher sought full consent from all participants in this study. For example, the interviews followed clear guidelines, which include the following matters. The first was the main purpose of the interviews (each respondent was provided with a thorough illustration of the benefits and the justification of this study). The second matter involved the ethical guidelines for the interviews (the ethical guidelines for interview techniques were explained to each interviewee). The respondents were all asked individually to grant the researcher their permission to store the interviews as a written statement in order to keep an accurate record of the data from their interviews; all of the respondents agreed (Yin, 2003). In addition, access to all sites of the research was made only after permission was granted by the Saudi Ministry of Education.

Moreover, all the participants in this research had complete freedom to take part in the activities and events regarding this study. For ethical purposes, the identities of the participants are anonymous in both the interviews and the questionnaires. The participants' names were not required when completing the questionnaire or any personal information before carrying out the interviews; instead, the participants were

assigned numbers (Busher et al., 2007). The interviews were conducted, as well as the questionnaires completed, during the participants' free time, whether this was during breaks or free periods. Additionally, the information they provided during the data collection process was used for the study purposes only.

3.10 Summary

This chapter outlined the methodology employed in the current study: the mixed-methods approach. It is a common method used in similar studies related to ICT integration. Moreover, the Portal is a relatively new phenomenon, and very few studies have covered aspects regarding ICT integration through an educational portal. This has emphasized the need to employ the mixed-methods approach, as each method reveals different aspects related to the study, so a greater understanding was obtained. The research design was also determined in this chapter, which consisted of two strategies: the case study approach, which is the qualitative method employed in the current study; and, secondly, the survey method, which is the quantitative method utilized in the current study. The main data collection tools in the current study were the interviews with selected experts (teachers, students and senior managers) and the questionnaires for both the teachers and the students. These triangulation data collection tools served to provide a rich source of data and increase the validity of the study. This chapter has revealed the extent of the reliability of the current study, which is relatively high.

Chapter Four: Analysis of the Qualitative Data (Interviews)

4.1 Introduction

This chapter analyses the content of the interviews conducted with the teachers, students and senior managers who took part in the study. Seven dominant themes emerged from the interview data, each of which is discussed in the light of the aims and objectives of the Tatweer initiative as set out in the Project documentation, as well as the Saudi Five-Year Development Plans, in turn below. These themes are as follows:

- the influence of the Portal on the teaching process;
- the influence of the Portal on the learning process;
- the integration of the Portal in the student assessment system;
- the compatibility of the Portal with the curricula;
- training in Portal usage;
- the policies connected with the Portal; and
- the leadership of the Portal.

The most important issues related to factors affecting the implementation of the Portal that emerged from these themes are then discussed.

4.2 The influence of the Portal on the teaching process

Responses gathered during the interviews with teachers, students and senior managers in relation to the impact of the Portal on the teaching process were categorized under three main subheadings in terms of ICT integration into the teaching process. These three subheadings are: the role of the Portal in *changing teaching practice*; using the Portal to achieve *new teaching strategies*; and using the Portal in *organizing school curricula*. These are discussed in detail below.

4.2.1 Changing teaching practice

One viewpoint that emerged from most of the teachers interviewed concerned the usefulness of the Portal for changing pedagogical practice through extending of the spatial and temporal space of the normal classroom rather than changing the traditional teaching methods in the classroom context. This point of view had affected teachers' beliefs about the benefits of the Portal for pedagogical practice, as well as teachers' behaviour in this regard. All the teachers and students interviewed were aware of the potential of the Portal for improving teaching and learning practice, as they showed their acceptance of the Portal. This was confirmed by the suggestions of the majority of the teachers and students that expanding the Tatweer Project to all schools in the KSA - after overcoming flaws in the Portal uncovered at the pilot or experimental stage - would lead to implementing ICT successfully into the teaching process through the Portal.

However, all the teachers interviewed considered the most important benefit of the actual use of Portal for communicating with students outside school hours. Further, most of the teachers pointed out that not activating virtual classrooms[4] had hindered the process of transforming traditional teaching methods through providing virtual lessons for students through the Portal. Hence, the majority of both the students and teachers adopted the view that activating virtual classrooms would contribute to achieving a higher level of communication between teachers and students outside school, as well as leading to real ICT integration into teaching practice.

Nonetheless, concerning the integration of the use of the Portal in the pedagogical practice of teachers in the classroom, the teachers showed a strong desire to use the Portal in the classroom. Through analysis of the interviews with the teachers, it was clear that the Portal was however still used within the traditional pedagogical practice

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[4] A virtual classroom is a system that allows the confluence of students with teachers via the Portal, and simulates what is involved in the traditional separation by providing a set of interactive tools, from live broadcasts, interaction, voice and talk scripts, interactive whiteboards, and other tools that ensure effective communication between the teacher and his/her students (Tatweer, 2010).

of teachers which had not been changed or transformed in this regard. In other words, the Portal had not shifted the traditional routine of teachers to a new one. In more detail, the majority of the teachers (9 out of 11) expressed their desire to use the Portal in their teaching in the classroom so that it would become part of their teaching practice routine. When the teachers were asked whether they believed that the teaching process was managed via the Portal in their schools, the greater proportion claimed that the Portal was at the 'teaching aid' stage, since it is non-mandatory in curriculum planning. Further, the students confirmed the view that the teachers had not significantly changed their pedagogical practice during the implementation of the Portal.

An example of this approach was that while many of the teachers (6:11) used the Portal daily inside the classroom, mainly to overcome the obstacle of their unfamiliarity with it, which they felt might hinder some students from using it productively by practising in the classroom. For instance, Teacher 4 described the following: "*We regularly access the Portal inside the classroom in order to familiarize the students with the Portal*". This was alongside existing teaching practices such as use of the interactive whiteboard (IWB). Teacher 2, for instance, illustrated that:

> *Inside the class, I use the interactive whiteboard and I access the Portal on a daily basis as I feel like it's an integrated part of the lesson.*

It may be that use of the Portal for the first time, as well as being at the stage of an experiment, is likely to be the reason for still being dependent on old methods of teaching. For instance, Teacher 2 claimed:

> *At the beginning, the use of the Portal was difficult because it was a new phenomenon; however, I have grown fond of it over time as it became easier to use.*

Most of the teachers and students agreed that the Portal was in need of further development and the full activation of the systems within it. Teachers believed it would make the changes and reforms required in the teaching easier if the Portal were to be implemented in the right way. They called for organisational improvements or the 'restructuring of schools' in order to achieve changes in the practice of the teaching

process in relation to the implementation of the Portal in pedagogical practice. This includes updating ICT infrastructure in schools that support the use of the Portal in teaching and learning practice. Most of the teachers (9) suggested that facilitating efforts in the school with the necessary equipment, such as electronic classrooms, interactive boards, providing software that suits the Portal for teaching the curricula, and establishing a high-speed Internet connection, is essential for the implementation of the Portal.

Further, only three teachers out of the 11 believed that either obliging teachers to use the Portal in teaching, or incorporating the usage of the Portal in the performance appraisal of teachers would lead to integrating ICT successfully into the teaching process through the Portal. Indeed, the analysis showed that the majority of the teachers tended to side with not making use of the Portal compulsory for teachers. It seems that the trial period of the Portal reinforced this attitude among teachers regarding their desire to take more time to recognise the potential of the Portal in supporting the teaching process. Finally, the majority of the teachers (9:11) interviewed indicated the importance of decreasing their workload and timetable so that they would have time to use the Portal properly. This would mean restructuring classrooms.

4.2.2 Achieving new teaching strategies

The teachers did not mention new teaching strategies that would replace traditional ones in order to facilitate the learning processes and the delivery of instruction through the Portal. It seems that the teachers considered the task of finding and building these strategies to be the responsibility of the school, and not the teachers alone. Many of them (8:11) indicated that these strategies should depend on strategic plans which are clear and understandable for all teachers, along with high-quality and focused CPD for teachers. Further, Teacher 9 felt that the Portal is a model that easily applies an e-learning strategy. She stated:

> *The e-learning strategy in schools has become a goal for many of the educational reforms in many countries, including Saudi Arabia. Also the educational Portal seems best suited for the application of e-learning and makes it part of the daily routine inside and outside the classroom context.*

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Thus, establishing a new strategy calls for deep changes to the structure and culture of teaching practice which are yet to be fulfilled.

There had been some aspects of change in the teaching process because of the implementation of the Portal, but they were relatively superficial and not deep enough to contribute to transforming pedagogical practice. They were also carried out through teachers' familiar and traditional teaching methods. The Portal did not have any significant impact on the students' relationships with each other in the classroom. In other words, it did not strengthen the cooperation between students, which means it had not been applied in practice for creating innovative learning tasks that enhance cooperative learning amongst students.

4.2.3 Using the Portal in organizing school curricula

The most prominent change in teaching practice was found through the organization of teachers of their school subjects through the Portal. This included the preparation of lessons and the management of curriculum content. This is significant in terms of the potential of the Portal to change teaching practice, where available, and the necessary changes to the organizational aspects of the school and at the classroom level.

It appeared that the Portal is able to play a major role in facilitating the shift towards preparing lessons electronically. Many teachers (6:11) prepared their lessons via the Portal. For instance, in an interview with Teacher 9, this female teacher pointed out that using the Portal helped her in preparing lessons through '*Easily scheduling and organizing the curriculum'*. School 1 (a boys' school) had demonstrated a large shift compared to other schools towards delivering the curriculum by electronic means rather than solely relying on paperwork to prepare lessons. This was likely to be due to a change made in the school leadership that supported teachers in using the Portal in preparing their lessons rather than using traditional lesson plans within paper formats. This reflects the importance of restructuring teaching practice in order to change the culture in the classroom.

Teachers at School 1 prepared their material in the form of PowerPoint presentations to display during the lesson, which were then uploaded to the Portal as learning materials for students to interact with during the lesson or at home. For example, an interview with Teacher 2 included the following: *"All my lessons are uploaded weekly to the Portal in different formats, often in Word format or sometimes in PDF format"*. Teacher 3 also asserted: '*I upload all lessons daily to the Portal for the students to keep up'*. Interviews revealed that teachers in School 1, which had shifted towards preparing lessons electronically, used the Portal regularly to keep track of the school curriculum. For example, Teacher 3 stated: *"The Portal was important in order to follow up my school curriculum implementation since it became the main source to prepare lessons"*.

Furthermore, use of the Portal allowed teachers more autonomy to expand the sources of school subject material outside their subject textbook, the latter described by some teachers as rigid. All the teachers agreed that the Portal increased and enhanced the curriculum content, as it provides students with new learning materials such as documentary films that serve school subjects. These films are uploaded on the Portal. For example, Teacher 1 confirmed:

> *Most films I used are about human body organs in order to enrich the scientific material of biology. This is due to the current curriculum lacking such material, and these films are easy to present.*

Some teachers also used websites, videos and PowerPoint presentations uploaded or referenced via the Portal to serve as learning resources. In addition, the teachers offered further explanations of the content of some lessons. However, there was an obvious and strong tendency to use textbooks as a basis for curriculum information, in line with organizational instructions in this regard. It seems this has led to restricting the use of the Portal as a source for curriculum materials.

4.3 The influence of the Portal on learning

The interviews with the teachers and students revealed certain findings, which were categorised under five main subheadings in terms of the impact of the Portal on the

learning process. These subheadings are as follows: *self-learning skills*; *learning incentives*; *supporting a collaborative learning environment*; *learning and problem solving through joint educational projects* and *improving students' academic performance*. Each of these subthemes are discussed in detail below.

4.3.1 Self-learning skills

Most of the teachers (7:11) reported that the Portal facilitated self-learning as it is used outside school hours, which gives a greater opportunity for independent learning as long as learners invest their time at home in using it for learning purposes. In more detail, Teacher 1 believed that the Portal had achieved self-learning because some students, characterized by a high level of intelligence and a tendency to use the Internet and technology, preferred this mode of learning to participating in traditional lessons. All of the students agreed that the Portal had enhanced their self-reliance because the Portal had increased the time that students spend on learning outside school, which in turn led to students having greater autonomy in their own learning. Many students (8:12) believed that the Portal facilitated the achievement of self-learning because it was used to design class presentations and allowed them to follow up the curriculum more efficiently. Moreover, the various learning resources available on the Portal had meant students could accomplish a heavier workload with reduced teacher assistance. For instance, one student from School 1 commented:

> *The Portal has allowed me to manage my learning independently of the teacher at home; there is a huge amount of learning resources available on the Portal which has made self-learning much more attainable.*

All the learning activities mentioned in this regard were achieved by using the Portal outside school. Nevertheless, there was no mention of the role of the classroom in developing self-learning skills among students by using the Portal, and this is consistent with the absence of specific teaching strategies concerning using the Portal, as mentioned above as a weakness in teaching practice when using the Portal in the classroom.

4.3.2 Learning incentives

Most of the teachers (9:11) claimed that the Portal had increased student motivation towards learning. For instance, Teacher 2 reported:

> *The Portal has motivated some students. They started to come and ask when lessons will be uploaded and where they can get some learning materials from the Portal and the Internet. I once added a web page as an information source to explain a poem and the students commented on it through the Portal. This showed that interactions of students through the Portal have increased.*

Similarly, Teacher 4 stated:

> *The Portal has increased students' motivation for search and discovery. They started to ask about when the lessons will be uploaded on the Portal. Therefore, students' effective participation has increased.*

Furthermore, most of the students (10:12) stated that the Portal had profoundly encouraged them to learn through systems such as Wiki and the discussion fora.[5]

Thus, through the examples presented in this context, it could be seen that there was a lack of models representing learning practices in the classroom. This indicates that there had been no real change in the learning tasks in the classroom as a result of the use of the Portal.

4.3.3 Supporting a collaborative learning environment

The Portal is considered to be a means of helping teachers to create an environment for cooperative learning among students, in particular at the classroom level. However, there was no development of learning tasks for students in the classroom, or even beyond, using the Portal in order to support collaborative and collective learning amongst students. Some teachers (3:11) believed that the Portal had created a cooperative environment among students that was limited to those who had participated in discussing topics through the Portal's discussion fora outside the

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[5] See Chapter 1 for more details in terms of the systems on the Portal.

classroom, as there is a forum for every subject and all users can access these and participate in them. Most of the teachers (8:11) felt that the goal of a cooperative environment had not been achieved because the Portal systems had not been completely activated. Some teachers added another reason for not practising cooperative learning tasks in the classroom. For example, Teachers 10 and 11 stated they had not noticed that the Portal had created a cooperative environment because the school was not completely prepared for students to use the Portal during school hours due to the lack of ICT infrastructure, in particular in not having classrooms equipped with interactive boards and PCs.

The interviews with the students generally confirmed the views of their teachers: that the Portal did not play a particular role in creating a cooperative learning atmosphere at the classroom level, mainly because the classroom-based learning tasks on the Midan LMS in the Portal were designed as individual exercises. However, students viewed the discussion fora on the Portal as facilitating a collaborative learning environment outside school, as students assisted each other by uploading notes and explanations of curriculum subjects. For example, Student 6 explained how he had benefited from some of his colleagues in other classrooms within his school:

> *I had a lot of trouble in solving a lot of the algebraic equations in maths, so my colleagues from other classrooms recommended for me to use the maths discussion forum in the Portal to help solve my problems. After the use of the Portal I was able to solve a lot of the problems related to my area of concern.*

4.3.4 Learning based on projects

The Portal was not able to link school curricula together through joint projects for students from one classroom, different classrooms in one school or in several schools. According to all the teachers interviewed, they did not use such projects because the Portal does not have this function. This matter had hindered the achievement of technological innovation through the use of the Portal in the educational process. Some teachers demonstrated a high degree of awareness of the importance of pedagogical practices through project-based learning. They claimed that learning based on projects is a student-centred learning approach to developing learners' multiple skills, such as problem solving and critical thinking. All the teachers also showed their eagerness to carry out such projects through the Portal. In the same way, the students reported that

the Portal was not designed to enhance thinking and problem-solving skills through joint educational projects due to the lack of Portal systems that would serve to develop these specific areas. Further, some teachers and students suggested that if the Portal website is to be developed and that such systems ought to be included.

4.3.5 Improving students' academic performance

Some teachers (5:11) expressed their belief that the Portal had enhanced the academic performance of their students. Teacher 3, for instance, stated:

> *Although there has been an improvement in the students' performance, I don't have the proper tools to decide whether it is due to the usage of the Portal; even though these two were simultaneous.*

In addition, all the students interviewed reported that the Portal had had a profound and positive influence on their academic achievements. For example, Student 2 stated:

> *I have been using the portal on a regular basis and I have noticed that my academic level has improved greatly through the use of the Portal's discussion fora as I found that it is jam-packed with all the necessary information that I need. I can also find immediate help and support from my teachers and from my colleagues.*

However, there is no statistical evidence that such improvements had been made; this was merely based on these students' and teachers' perceptions.

4.4 Integration of the Portal in the student assessment system

Across all the schools that were included in this study, the primary influence was clear of the absence of policies related to either assessing the performance of school students through technology, or assessing students' use of technology across school subjects, through integration of the use of the Portal as an assessment criterion of students. As a result, the current methods for assessing the academic performance of the students across school subjects were not supported by the use of technology. There is an exception with the IT curriculum, which is, however, limited to the development of basic skills for students to use computers and basic programs, such as Word and Excel, without connecting with any other school subjects.

The centralisation of the structure of the educational system in the KSA in terms of the standardisation of curriculum and assessment policies hinders technological innovation. Neither schools nor, subsequently, teachers in the current Saudi educational system have any power or authority in the selection of instructional materials in the teaching of school curricula, as teachers are restricted to using textbooks which are recognised by the Saudi Ministry of Education and are officially compulsory. Criteria for assessing the performance of students focus on the essential coverage of the content of subject textbooks, and lack emphasis on the recruitment of technological skills in this regard. For more clarification, these standards do not include the use of collaborative projects between students, thus linking the curricula, which usually rely on the employment of technology.

Hence, the interviews with the teachers showed that the current assessment system does not support using ICT in general and the Portal in particular in school subjects (school curricula). In this regard, the New Saudi Educational Strategy has implemented a project to develop school tests and tools for students' assessment (Tatweer, 2013). However, the Tatweer Project has not yet published any details about this initiative.

However, many of the teachers included the use of the Portal in their assessment of their students informally, through:

▪ Giving the students some assignments to do online whereby students have to answer directly on the Portal. Other assignments are to be answered on a separate sheet and handed in to the teacher.

▪ Practice tests uploaded on the Portal to be answered by the students and marked online by the teacher. This helps students to determine their level.

For example, Teacher 3 claimed:

> *I have uploaded exercises and they answered them, then the assignments have been given back to me by the students online or handwritten for feedback.*

It was clear that there were no clear indicators of the practice of the assessment of students' performance through innovative learning tasks on the Portal, as the tasks mentioned by the teachers were traditional and repeated learning tasks. In addition, the

Portal systems did not include special tools, such as e-portfolios, for student assessment.

Furthermore, some teachers (3:11) assessed how well the students used the Portal via crediting extra marks for students who used the Portal regularly for extra learning activities outside classroom.

Reasons that were given as barriers to the integration of the Portal in the practice of teachers for the assessment of their students revolved around organisational issues outside the responsibility of the teachers. Some teachers (5:11), in spite of having a generally positive belief regarding the importance of the assessment of students through the Portal, stated that they did not use the Portal to assess students. The main reason for two of them was that Portal use was non-mandatory across their subject curricula.

For example, Teacher 1 reported:

> *I assigned students activities related to ICT, like watching videos or preparing presentations by using PowerPoint. However, students' use of the Portal was not assessed by teachers since it is a new notion. Besides, the Portal is used to educate students and encourage e-learning.*

The other three teachers, who did not use the Portal in the assessment of students, stated that the reason behind this was the limited amount of time, as this method of assessment would place an extra burden on them. This approach could also restrict the time allocated to finishing the curriculum requirements on time. However, the majority of the teachers (the rest of those interviewed) held the view that the main hindrance to using the Portal in the student assessment process could be divided into two factors: a lack of policies related to using the Portal to assess students' performance and a lack of training on conducting assessment through the Portal.

Furthermore, in terms of changing student assessment by integrating ICT into the learning process through the Portal, teachers suggested conducting all tests through the Portal, making the assessment process part of the learning process by assigning and doing homework through the Portal and making assessment electronic rather than handwritten.

Regarding assessing students through the Portal, the students asserted that delivering assignments online was better than delivering them in the usual way (i.e., handing

them in physically), as it made the usual task of doing homework quick and easy. Further, students strongly supported sitting online practice exams and activating students' and teachers' personal e-mails via the Portal as a form of assessment.

Not addressed by the teachers and students were the core of the relationship between the development of both teaching practices as well as learning practices through the Portal and the development of the practice of assessing students using the Portal. The weakness of Portal integration in the process of assessing students seems to be mainly due to the lack of innovative practice of the Portal in the students' learning process.

4.5 Compatibility of the Portal with the curricula

Teachers can be placed into two separate categories regarding their different perspectives of the impact of the current curriculum on the efficient use of the Portal. The first category comprises the majority of the teachers interviewed (7:11), who held an idealized view that a curriculum has an overall concept of cognitive content since it includes a set of goals for forming teaching approaches, as well as learning tasks. The teachers in this category agreed that carrying out the Portal project had not changed the current school curriculum goals. Teachers were still teaching according to the goals of the old curricula, which were dependent on textbooks and there was a lack of implementation of ICT pedagogically. Therefore, these teachers believed that the current curricula did not coincide with Portal usage for achieving technological innovation, indeed, to the extent that the current curricula would actually form a hindrance for the Portal. Teacher 1, for example, pointed out the inevitability of changing the current curricula in order to cope with technological changes and suit the local reality and environment. Likewise, Teacher 9 highlighted the importance of providing the Portal project with new curricula compatible with incorporating technology into teaching and learning. In terms of modifying the curricula for ICT integration into the learning process through the Portal, teachers in this category suggested making changes in the curricula in the schools implementing the Portal, increasing and concentrating on the activities of the Portal, and modifying the curricula to fit ICT in general and the Portal in particular.

The second category was the view, which emerged from a minority of the teachers, who viewed the school curricula as the content of the textbooks for school subjects. Therefore, they believed that the current school curricula did not hinder the current use of the Portal, as teachers were able to teach using their traditional teaching methods when they used the Portal in their school subjects. For example, Teacher 2 stated:

> *The curriculum or textbook of my school subject is not an obstacle to using the Portal; I have managed to align the curriculum with the Portal by using my old teaching methods without encountering any problems.*

The current situation in the school system in the KSA, in which the Ministry of Education has absolute control over all elements of the school curricula through the textbooks set, has led to the Portal being confined to expanding the role of textbooks as the main information resource for the subject curricula, without creating pedagogical changes in teaching methods or the learning practice of students. All the teachers in both categories referred to above agreed that the Portal had increased and enhanced the current school curricula, as it provided students with new learning materials, such as documentary films, that serve as school topics. Further, the Portal had increased the use of the digitized form of the curricula in schools implementing the Portal. An example of this was the electronic textbooks for some school subjects that were used in PDF format by five out of the 11 teachers.

The students' views concerning the impact of school curricula on the implementation of the Portal also fell into two camps. One group of students believed that the curriculum was limited to textbooks and argued that the current curriculum was sufficient. The other group of students, who had a broader view of the curriculum, claimed that the current curriculum was in desperate need of change in order to fit within the Portal project.

There was also recognition of the efforts being made by the makers of educational policies in the KSA regarding the development of the school curricula and linking these to technological innovation. The Ninth Saudi Five-Year Development Plan (2010-2014) indicated that the Saudi Ministry of Education was working on the implementation of projects for the development of education. This included a comprehensive project for the development of the curriculum (*Almashro' Ashamal*), a project for secondary education development, a development project for mathematics and science curricula, and a project to develop the English curriculum (Saudi Ministry

of Economy and Planning, 2010). Moreover, the New Saudi Educational Strategy had launched a programme for digitizing curriculum content (Tatweer, 2013). In addition, the New Model for Tatweer Schools indicated that a curriculum should not constitute the textbooks alone; instead, it is a set of learning resources that are employed by teachers as part of the curriculum (Tatweer Programme of the Development of Saudi Schools, 2012a).

The inflexibility of the current school curriculum and limiting educational activities to textbooks had contributed to the weakness of the effect of the Portal in relation to extracurricular activities. In other words, teachers did not use the Portal for these activities due to limited time and a large workload.

4.6 Training in using the Portal

The theme that was related to ICT training generally and the Portal specifically can be divided into three subheadings: *training teachers*, *training leaders*, and *training students*. Each of these subthemes is discussed in detail below.

4.6.1 Training teachers

Saudi schools do not have autonomy and independent funds to plan and carry out CPD for their teachers, including the training related to using ICT. The teachers also indicated a lack of INSET provided by the Ministry of Education. While there were a few voluntary short courses provided for teachers regarding the practical use of some Microsoft Office programs, such as Word, Excel and PowerPoint, as well as utilizing IWBs in classrooms, there was no formal CPD for teachers on the pedagogical use of ICT in general.

In relation to the specific use of the Portal, training was limited to one introductory course and to the systems of the Portal which none of the teachers found to be adequate. This orientation course was held for only one week for each school. Most of teachers pointed out that this short programme was intended to provide teachers with an introduction to the general basic systems of the Portal. This understanding was

confirmed by Official Senior Manager 1 at the Saudi Ministry of Education, who was a female trainer and who constructed the policies of the training course in cooperation with the Tatweer Project. She elaborated that the week-long training course for teachers was enough to teach them the basic Portal systems and more advanced training could be obtained by working through a user's training manual for each system of the Portal. Hence, this introductory programme did not cover training for usage in some of the Portal systems. For instance, Teacher 4 commented:

> *I don't know a thing about the Wiki application of the Portal, and it was not mentioned in the training course. The training course concentrated on the main issues such as how to upload lessons and how to use the links available on the Portal.*

Further, this orientation programme was severely lacking in addressing the use of the Portal in pedagogical practice. Hence, many teachers indicated that they still desired more advanced and specific training programmes related to using the portal pedagogically. For example, Teacher 3 commented:

> *Teachers need pedagogical training to be able to use the Portal; there is a need to provide specialized training in different subjects to each teacher individually, including practical training sessions in how to integrate ICT for each subject through the Portal. In fact, the training course provided in the school covered only key steps for using the Portal, while we need specialized courses in designing the material and creating training portfolios through the Portal.*

To compensate for this lack, many teachers depended on informal support from their peers. For example, Teacher 2 mentioned that he had learnt a lot about the Portal through practice, asking colleagues and searching the Internet (for other people's experiences). Moreover, many teachers indicated that they participated in the educational dialogue fora through discussion groups on the Portal, particularly the Teachers' Forum, to exchange creativity, products, and views regarding their course materials, the dissemination of electronic, interactive lessons, teaching skills and strategies, as well as participating in the Computer and Technical Forum to discuss issues related to computers and effective educational technology. Teachers in several Tatweer schools had participated in these discussion groups. Some teachers described this experience as a valuable form of informal training.

Teachers' suggestions in relation to CPD for ICT, especially Portal use, raised the urgent need for the development of training in this regard. These suggestions reflected

the teachers' views on developing ICT training that would include raising the level of instruction related to the Portal project, along with finding a means for assessing trainees to ensure they had adequately learned the required level of skill, since the current training programmes did not assess the trainees' level at the end of the course. Moreover, some teachers suggested allowing teachers enough time for ICT training programmes and engaging them in additional and intensive ICT-specialized courses, as well as enrolling distinguished teachers on diploma courses in ICT application, e.g., school administration diplomas and curricula administration diplomas. The outputs of such courses could be employed to enable the successful implementation of the Portal into the teaching and learning process. Finally, many teachers recognized the importance of receiving advanced specialized courses in different systems of the Portal.

4.6.2 Training leaders

None of the interviewed senior school managers had received any training in Portal usage. For example, Official Senior Manager 2 and Official Senior Manager 3 reported that there was no satisfactory training programme designed to meet head teachers' desire to lead the process of ICT implementation through the Portal. Both managers agreed that under existing arrangements, school leaders had no significant role in leading the process of ICT integration through the Portal, as they had insufficient knowledge and experience to be of any assistance to the teachers.

The analysis of the teachers' interviews showed that when the majority of teachers had queries about pedagogical Portal usage, they sought the schools' coordinator for Portal implementation who works at the Saudi Ministry of Education. Therefore, the analysis elucidated that leading the process of ICT implementation through the Portal was performed by the project officials and the supervisors at the Saudi Ministry of Education but not by the school leaders, who were not qualified to do so. An example was given by Teacher 5, who reported:

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Our female school director could not have seen what has been provided by the female teachers through the Portal until the end of the year when she was authorized to access and follow up.

According to the Tatweer Project documentation, most head teachers of Saudi schools do not have adequate information or opportunities for educational leadership or to work independently to enable them to improve and develop teaching and learning practices. The pursuit of such capabilities is important in any educational system, and should be achieved through the development of higher vocational initiatives and the application of leadership standards (Tatweer Programme of the Development of Saudi Schools, 2012a). Moreover, the system in Saudi schools lacks the presence of a head of department or a subject leader who can play a leading role in the process of teaching and learning in the school with respect to ICT/the Portal (Tatweer Programme of the Development of Saudi Schools, 2012b). Another of the most prominent obstacles to the role of schools in leading the process of teaching and learning is that the school system is completely subject to supervision by the Saudi Ministry of Education. Finally, the supervision system does not support an effective mechanism of incentives and accountability for schools (Al-Hakmi,[6] undated). However, in the New Model for Tatweer, head teachers and heads of school subjects will be qualified to hold greater power and take responsibility for the learning and teaching process since they will be able to supervise the teachers (Tatweer, 2013).

4.6.3 Training students

The students had found that training related to the Portal was not sufficient and did not meet their needs. Training given to the students was, for the most part, a personal guidance performed by teachers. There were no concentrated training sessions held for students. Many of the teachers viewed the majority of students as having the skills required to use technology. Thus, the teachers' role was to encourage students to use the Portal and to maximize what was available. Furthermore, some students had more

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[6] Ex-Director of the Tatweer Project.

skills than the teachers themselves in regard to using technology. For instance, Teacher 4 stated:

> *Students have the skills to use computers and surf the Internet better than many teachers. For example, a student helped me with uploading a lesson on the Portal. Now, in our society, the current generation is prepared to accept and get involved in e-learning as we are living in a technology era in all fields.*

However, while many students may have relatively advanced technical skills, this is not the same as understanding how these might be used in pedagogically useful ways. This is where the role of the teacher is important. Therefore, without the relevant knowledge and experience, teachers may not be able to devise suitable online materials or tasks that can take advantage of students' capabilities with technology. This case highlighted the importance of efficient training for teachers to use the Portal since teachers have a fundamental role in guiding students to use the Portal educationally. The students' suggestions included providing them with regular training in the Portal systems. They also suggested preparing students and training them for a sufficient period of time before implementing the Portal.

4.7 Policies relating to the Portal

Following the analysis of the interviews, three main subheadings were created in terms of Portal policies: *the involvement of schools in the policy-making procedure*, *the policy vision*, and *practicable means for achieving the policies*.

4.7.1 Involvement of schools in forming Portal policies

There was no actual participation of schools in the design of the Portal policies. There was only a workshop, which was held for a selected group of senior managers and teachers to give their general suggestions for carrying out the Portal project. A general guide was, therefore, issued by the Tatweer Project without active participation by

schools for clarifying the responsibilities of the Tatweer Project, the Departments of Education (educational districts that work as Local Education Authorities in Saudi districts),[7] the school leadership and the teachers with regard to implementation of the Portal. Further, this guide stated that the Tatweer Project is responsible for the issuance of policies governing the implementation of the Portal in the educational process (Tatweer, 2011), without reference to any role for the participation of schools.

Therefore, most of the teachers interviewed and all of the students claimed that they had not participated in designing the Portal policies. For example, Teacher 3 emphasized:

> *We were not involved in the planning process of formulating policies of implementation of the Portal. We do not have any details on these policies, and we do not know what strategies are to be implemented. We have only been given general guidelines on how to integrate ICT into the learning process through the Portal, without ideas for implementing them.*

Moreover, Teacher 11 summarized this feeling, stating: "*the teacher has to implement the policies without intervention in designating them*". Further, school leaders were not involved in drawing up the Portal policies.

The teachers and students suggested that they should have been involved in that experience so that they could have communicated their ideas regarding drawing up Portal policies.

4.7.2 Policy vision of the Portal

The Portal policies related to the vision were not long term, as they were intended for the first phases of the implementation process. All the teachers interviewed agreed that the vision of the policies of the Portal had been imposed by the Tatweer Project, without schools having a share in the process. The role of schools was to apply this vision. However, the analysis showed that, overall, the teachers, senior managers and students did not have an in-depth understanding of the vision in terms of ICT

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[7] There are 45 educational districts in the KSA.

integration through the Portal into pedagogical innovations, as their responses were superficial and orientated around 'e-learning' rather than changes in teaching and learning. For example, Teacher 4 commented:

> *In my opinion, there has not been a clear-cut vision, as we have been required suddenly to implement the Portal without qualifying the school adequately before that.*

Official Senior Manager 1, who represented the Saudi Ministry of Education, pointed out that the vision had established an interactive and motivational educational environment. She added that the real objectives of this policy were to foster a culture of e-learning.

The teachers suggested that the vision and aims of the Portal should be simplified and elaborated in order to allow easy communication through the better understanding of both teachers and students. Therefore, they highlighted the importance of distributing detailed booklets about the current and future policies of the Portal, including visions, goals and plans.

When the teachers were asked whether there was a link between the Portal and the national ICT strategies, as well as the new innovations related to educational reform in the KSA, most of the teachers (10:11) agreed that there was a connection. For example, Teacher 4 claimed:

> *Yes, there is a link between these policies; and the Portal project is an advanced form of ICT; hence it would naturally relate to the policies of the national ICT strategies, for instance.*

Meanwhile, some teachers felt that there was a need for greater coordination between the Saudi Ministry of Education and the Tatweer Project in this regard.

4.7.3 Practicable means for implementing Portal policies

There had been no clear action plans or strategy for setting up policies for the Portal before the project was implemented. Further, in none of the four schools was there any action plan or viable strategy to develop the infrastructure of the Portal electronically, which ought to have been developed by the Saudi Ministry of Education and the Tatweer Project. Thus, schools' participation was symbolic; in other words, the

involvement of schools in the action plans of the Portal was limited, which meant that the planning for the Portal project still followed a top-down process. Teacher 10 stated: *"Our school wants to implement the project of the Portal but poor ICT infrastructure is a hindrance to that"*. Similarly, Teacher 11 mentioned that the most important practical means of implementing the Portal project would be to provide electronic classrooms with fast connections to the Internet, along with a laptop for each student and teacher. The analysis showed that although the interviewees focused on the ICT infrastructure of the school, they had not given much thought to the action plans or strategy related to training, CPD and the pedagogical innovation related to using ICT or the Portal.

4.8 Leadership of the Portal

Interviews conducted with students, teachers and senior managers gave rise to certain findings related to the leadership of the Portal, which were categorized under five subheadings: *financial support*, *managing the Portal*, *motivating students and teachers*, *technical support related to the Portal*, and *establishing a real partnership with families (students' parents)*. These are discussed in detail below.

4.8.1 Financial support

The Saudi Ministry of Education is currently responsible for supplying computers and software to Saudi schools for using ICT. However, there is a severe shortage of hardware and software, as well as poor maintenance of the equipment. Hence, through the interviews, it became clear that there needs to be an independent, realistic budget to provide financial support for the schools selected to implement the Portal project in order to compensate for any deficiencies. This support which would include equipping the school and classrooms with PCs, employing the necessary technicians, maintenance, a strong Internet connection and a wireless network, laptops, PCs or tablet devices (e.g., iPads) for every student, teacher and administrator, providing

interactive programs compatible with school subjects, such as Semanoor,[8] which are not available on the Portal website, and developing a user-friendly interface for the Portal website. The analysis of the interviews with teachers and senior managers also showed that schools did not have funds for carrying out special training or providing technical support for using the Portal.

The New Model for Tatweer Schools is dependent on the transition from the centralized to the decentralized, balanced by transforming and strengthening powers, accounting for the educational administrative districts and schools, and the use of indicators of performance to lead development and activation, as well as increased financial and administrative autonomy for schools (Tatweer, 2013).

The directory of The New Model for Tatweer Schools indicated the need in Tatweer schools for halls that are well-equipped classes for use by teachers to implement ICT into their subject. Each hall should be able to serve six classes (Tatweer Programme of the Development of Saudi Schools, 2012c).

The Tatweer Project has also launched a programme to improve the learning environment, school buildings and equipment (Tatweer, 2013), which included providing IWBs and training in their use. For example, Teacher 5 stated:

> *In this year our school has joined the Tatweer programme for enhancing school environments pedagogically and technologically. This programme aims to improve the school environment to fit educational environment requirements that encourage students as well as teachers. To begin with, the school will be provided with a number of IWBs to be put in some classes and training courses will be held for teachers concerning use of IWBs.*

4.8.2 Managing the Portal

The teachers interviewed agreed that the leadership of the schools played no significant role in implementing the Portal project, since there were no leaders available who were ready to manage ICT integration through the Portal inside these schools. To elaborate,

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[8] Before launching the Portal, the Semanoor program was used in some schools and was effective because it contained electronic content and interactive information related to Saudi school curricula.

there was an Educational Supervisor for each school who was working for the Educational Supervision Office to which each of the four schools is affiliated with the Saudi Ministry of Education. These experts have experience in ICT and are responsible for coordinating the Tatweer Project, while the role of school leadership was simply to provide a user name and password for each member of staff and student in the school for access to the Portal in accordance with the general guide for the Portal (Tatweer, 2011). Therefore, most teachers regarded this as an obstacle to the success of the Portal project. Consequently, the vast majority of the teachers thought that school leaders did not have any role in incorporating ICT in the teaching and learning process through the Portal.

Furthermore, all of the teachers agreed that the distribution of leadership responsibilities concerning the integration of ICT in the teaching and learning process through the Tatweer Project was not clear-cut. Teacher 10 remarked:

> *There is an external educational supervisor working for the Educational Supervision Office affiliated to the Ministry of Education with whom we communicate occasionally in terms of using the Portal pedagogically.*

In addition, all the teachers emphasized that the contribution of their senior directors had been supervisory. Teacher 4, for instance, mentioned:

> *The directors in my school have guided us, but they have not participated in using the Portal technically or pedagogically.*

Teacher 1 also regarded the head teacher's participation as partially supervisory. On the other hand, Teachers 10 and 11 claimed that they had not noticed the school leadership's participation and they did not have any idea whether there had been any. Further, most of the teachers (7:11) suggested that appointing a full-time manager technically qualified to manage the Portal was crucial for successfully integrating ICT into the teaching and learning process through the Portal.

4.8.3 Motivating teachers and students

According to the teachers, there was limited motivation concerning the integration of ICT into the teaching and learning process through the Portal, and there was no financial motivation since the schools included did not have independent budgets. For

example, Teacher 11 stated: "*In our school, there is no material incentive at all, and motivation is rare*". The motivation offered included acknowledgement and honour certificates, and, in one school, exemption from preparing lessons in writing (School 1) for the teachers using the Portal. It is worth noting that some teachers were promised material rewards, such as iPads and training courses outside the KSA, by their school leaders but none of that had been fulfilled. The teachers agreed that the leadership of the schools implementing the Portal project do not offer any support to the integration of ICT into the teaching and learning process through the project. Some teachers (5:11) suggested that the Saudi Ministry of Education did not motivate them to use the Portal, and that one way to motivate would be to launch a termly contest for the best teacher and the best student using the Portal at the school level. In the New Model of Tatweer Schools, head teachers of schools will have greater autonomy in practising the policies aimed at motivating teachers and students (Tatweer, 2013).

The students found that a few teachers contributed to motivating their use of the Portal by using various methods of encouragement, such as awarding marks for online participation or outlining the advantages and strengths of the websites, as well as strengthening the beliefs and attitudes of the students towards the integration of ICT into the learning process through the Portal. Further, students felt that there was no concrete support on the school leaders' part for the integration of ICT in learning via the Portal.

4.8.4 Technical support related to the Portal

In terms of technical support of the Portal, while a few teachers were satisfied, the majority were not; as they felt that the technical support offered was weak and not particularly timely. For example, Teacher 11 claimed:

> *There is technical support, but it could not solve some problems. A number of messages concerning problems we have encountered in using the Portal have been sent, but we did not receive a reply.*

According to all the teachers, there is no technical support centre, either in their schools or in the education administration to which they are affiliated, but the Tatweer Project undertakes the responsibility for technical support. For instance, Teacher 2 reported:

> *There has been a breakdown in the Portal which was mended within a day or less; such breakdowns occur every two weeks and get mended by the Tatweer Project, not by the school administration.*

In addition, technical support engineers are available only through the Tatweer Project and not in the schools, but in each school there is a director from the Supervision Offices affiliated to the Ministry of Education who is responsible for communicating with the Tatweer Project concerning technical support. Most of the teachers (7:11) suggested providing a technical support team as a unit or a specialized manager in every school in order to assist the implementation of the Portal into the teaching and learning process.

In the New Model of Tatweer Schools there are ICT curriculum coordinators for ICT support, as well as leaders in school subjects for pedagogical support (Tatweer Programme of the Development of Saudi Schools, 2012a).

4.8.5 Establishing a real partnership with families (students' parents)

Through analysing the interviews, we can understand that before implementing the Portal, a survey had been conducted by the leadership of the schools implementing the Portal in order to make sure that each student had a PC with access to the Internet at home. In addition, permission was taken from parents to allow students to use the Internet at home. For example, Official Senior Manager 3 reported:

> *We make sure that students have PCs and Internet at home. Letters have been sent to parents to urge them to provide PCs and Internet for their children to facilitate using the Portal. Besides, a students' database is made for that regard.*

The analysis showed that the students had personal computers in their homes. Most of the students also had access to the Internet at home. It was further found that students

were encouraged by parents to use technology. Some of the teachers mentioned that a very small percentage of students did not have computers or the Internet in their homes. Some of the teachers pointed out that it is doubtful that there are no students who do not have access to computers at home. Some teachers argued that in modern Saudi society there is hardly a household without a computer or access to the Internet. Some teachers stated that in some homes in Saudi Arabia there are personal computers for each individual member of the family. Finally, unfortunately students' parents did not have authority to access the Portal, as the Portal was only accessed by students, teachers and school staff.

4.9 The most important issues forming factors affecting the implementation of the Portal

From the analysis of the interviews with teachers and students, six common issues emerged with respect to the factors that affected the implementation of the Portal. These issues are ranked in terms of the number of factors that were identified by both teachers and students. These issues are: *the leadership related to the implementation of the Portal*; *the pedagogical use of the Portal*; *the infrastructure of the Portal*; *the professional development of teachers to use the Portal effectively*; *the role of parents in supporting the Portal project*; and, finally, the *policies associated with the Portal*. Analysis of the responses indicated that both teachers and students identified the first two of these issues - leadership and pedagogy - as the most potent in influencing the implementation of the Portal in teaching and learning.

4.9.1 The issue of the leadership of the portal

Not surprisingly, the issue of leadership was predominantly the concern of the teachers, although three factors - customizing independent budgets for schools;

technical support for users of the Portal; and motivation by the Ministry of Education regarding the use of the Portal - were mentioned by both teachers and students.

Both teachers and students indicated that although these factors constituted important stimuli to the use of the Portal, they were either completely absent or weak during the implementation of the Portal in the schools included in the study phase. Moreover, the common consensus of opinion among teachers and students on these three factors served as a good indication of the importance of these factors in the success of the Portal project.

The two factors which were only mentioned by the teachers were the availability of a dedicated leadership to manage the Portal pedagogically in each school, and eliminating the use of paper in the preparation of lessons by teachers when they use the Portal as a form of encouragement and motivation. The first factor focused on the educational administration of the Portal through achieving the integration of the Portal in the educational process. It is worth mentioning that all of the teachers and students had recommended allocating a full-time manager to manage the Portal pedagogically. This shows the importance of this factor, even though it was not mentioned by the students as among the factors affecting the use of the Portal. The importance of the factor related to motivating teachers who used the Portal of eliminating the use of paper in the preparation of lessons was a motivation for some teachers. It is worth mentioning that this motivation was at the school level, where the use of paper in the preparation of lessons was eliminated by the school management in one school.

4.9.2 The issue of pedagogy

The students interviewed gave more attention to the issue of pedagogy, as they identified five factors related to this issue, compared to the teachers, who only identified three. This might be because students are the basis of the learning process. The analysis also showed that the three factors that were identified by both teachers and students seemed to be important in the formation of the issue of pedagogy regarding the use of the Portal. These three factors were: the development of the Saudi

curriculum; students' tendencies to use ICT in learning; and the teaching methods of teachers. The analysis also indicated that the development of Saudi curricula in order to fit the Portal was the only factor that was repeated in the suggestions of both teachers and students. This reflected the importance of this factor.

The two further factors that were mentioned by the students related to the pedagogical issue: the need for teachers to encourage and motivate students regarding the use of the Portal, and the need to prepare students and train them for a sufficient period prior to the implementation of the Portal project. Significantly, these two factors were directly linked to the roles that teachers were expected to play in the implementation of the Portal project. In other words, the motivation and encouragement of students by teachers is a pedagogical factor, and training and preparing students to use the Portal relates to the competence of teachers and their educational tasks. The identification of the importance of these two factors by students underscores the importance of the role of teachers in the training of students in the use of the Portal, as mentioned previously in this chapter.

4.9.3 The issue of the infrastructure of the Portal inside schools

There was a general consensus among the teachers and students on the issue of the weakness of the infrastructure needed to use the Portal within the schools surveyed. The teachers highlighted three additional factors as part of this issue. The majority of the teachers and students pointed to the importance of the availability of high-speed Internet access in school, as well as the technical equipping of classes in terms of the implementation of the Portal. The teachers and students explained that the lack of these two factors was hampering the successful use of the Portal in the educational process in schools. Many students stressed the importance of including IWBs among classroom equipment. Students justified the importance of the IWBs if they were linked with the Portal to facilitate the understanding of lessons through the Portal. Students pointed out that the successful use of the Portal in the classroom was only achieved where IWBs were connected to a computer and the Internet. They confirmed that their classrooms and schools were not equipped with computers for students.

The study found a slight discrepancy between the teachers and the students in terms of their responses in relation to the third factor. While most of the teachers viewed the importance of the availability of programmes that can aid teaching on the Portal, most of the students viewed as important the availability of computer software that supported use of the Portal within the school.

Thus, the factors constituting the issue of infrastructure included the following: the availability of computers and other technical devices, the availability of the Internet, and the availability of suitable instructional programmes.

4.9.4 The issue of the professional development of teachers

The teachers were more interested in the issue of their professional development than the students. The teachers identified three factors relating to this issue, while the students mentioned only one. This is understandable because the issue of the professional development of teachers directly pertains to the teachers and not the students. Both the teachers and the students indicated that the issue of the weakness of professional development for teachers was considered an obstacle to the use of the Portal in the pilot phase. Both the students and the teachers emphasized that the factor of the lack of experience of teachers and inadequate training constituted a hindrance to effective use of the Portal.

Most of the teachers interviewed stressed the importance of specialized training courses in designing lessons through the Portal as a factor representing professional development. A number of teachers also pointed out the importance of training teachers to assess students through the Portal as a stimulus factor for the use of the Portal. It is worth mentioning that many of the teachers stressed the importance of providing teachers with subject-specific training through the Portal among their suggestions for the development of the Portal project. The list of students' suggestions, on the other hand, included those concerning strengthening the training in the use of the Portal generally.

4.9.5 The issue of parents' support for the Portal

Teachers and students agreed that there were two factors involved in this issue: the interaction of parents and their enthusiasm towards the use of the Portal in the education of their children, and the availability of computers and the Internet in the homes of students to facilitate the use of the Portal outside school. This agreement between teachers and students demonstrates the importance of this issue.

4.9.6 The issue of the Portal policies

The teachers expressed greater interest in the issue of the Portal policies than the students, particularly with regard to the integration of the Portal in the pedagogical policies that aim to achieve creativity. The teachers further identified two factors under this issue: the participation of teachers in the formulation and procedures to draw up Portal policies, and linking Portal policies with Saudi national policies and strategies for the integration of ICT with regard to new initiatives to reform the Saudi education system. The students, on the other hand, identified one factor under the issue of Portal policies: the participation of students in drawing up the policies.

The study shows that the vision of the policies of the Portal was not clear, particularly as the Portal project was in the pilot stage. It was found that both the teachers and the students agreed that future Portal policies should include the following: the Portal should be made compulsory; it should be used in student assessment; and the Portal project should be expanded to include all schools in the KSA. In addition to this, some teachers suggested the use of the Portal in the performance appraisal of teachers.

4.10 Summary

The analysis has shown that the Portal is seen as a 'teaching aid'. Further, the key usefulness of the Portal in the teaching process is to present a means of implementing

an e-learning tactic, whereas the fundamental usefulness of the Portal in the learning process is to make self-learning more achievable for students. However, the Portal had not proved to be useful in developing students' critical thinking and problem-solving skills or in changing teachers' pedagogical practice. On the other hand, the main obstacles to implementing the Portal were identified as the lack of ICT infrastructure and inadequate training. The analysis has revealed a lack of understanding when it came to Portal policies. In addition, leading and managing the Portal was undertaken by the leadership outside the schools. The implementation of the Portal had not led to changes in the current assessment procedure or the curriculum. The main factors affecting implementation of the Portal were categorized into five issues: leadership, pedagogy, infrastructure, professional development of teachers, and parents' support.

The responses gathered via the qualitative analysis will be used in Chapters 5 and 6 in relation to three main themes: suggestions of teachers as well as students related to the Portal, the benefits and acceptance of the Portal, and the factors influencing Portal implementation.

Chapter Five: Analysis of the Quantitative Data (Teachers' Survey)

5.1 Introduction

In this chapter the teachers' questionnaire is analysed under six main sections:

- The profile of the participants (teachers), including their age group, gender, qualifications, training and use of the Portal.

- The potential usefulness and acceptance of the Portal from the teachers' perspective.

- The factors affecting the implementation of the Portal.

- The suggestions from teachers for the successful implementation of the Portal.

- The differences in the level of agreement of all items related to the potential usefulness and acceptance of the Portal, the factors affecting the implementation of the Portal, and the teachers' suggestions for successfully implementing the Portal.

- The main issues of the factors influencing the implementation of the Portal

5.2 Personal characteristics of the participants

5.2.1 Gender

Analysis of the sample of teachers indicates that more than three-quarters (77.5%) of the participants were female. This high percentage was anticipated due to the nature of the population of this study. Moreover, the researcher did not have the ability to obtain a larger male sample because this study covers schools implementing the Portal in the capital city of the KSA, Riyadh. There are only four schools implementing this

project, and only one is an all-male school; the remaining three are all-female schools, as the Saudi educational system is single-sex (see Table 5.1).

Table 5.1: Distribution of genders among the selected schools

School	N/%	Gender		Total
		Male	**Female**	
School 1	N	16	0	16
School 2	N	0	25	25
School 3	N	0	18	18
School 4	N	0	12	12
Total	**N**	**16**	**55**	**71**
	%	**22.5**	**77.5**	**100**

5.2.2 Age

As can be seen in Table 5.2, the mode of the 'age group' variable in the sample is the age range of 25-40 year olds, constituting three-quarters (76%) of the teachers who participated in this study. It is also the dominant age group in all the surveyed schools of the sample. The teachers over 40 years of age represent around 18% of the sample. Finally, teachers below 25 years of age represent 5%.

Table 5.2: Age group

School	N/%	Age group		
		< 25	**25-40**	**> 40**
School 1	N	0	15	1
	%	0.0	93.8	6.2
School 2	N	2	20	3
	%	8	80	12

School 3	N	2	12	4
	%	11	67	22
School 4	N	0	7	5
	%	0.0	58	42
Total	**N**	**4**	**54**	**13**
	%	**5.6**	**76.1**	**18.3**

5.2.3. Academic qualifications

Table 5.3 shows that teachers who hold a Bachelor's degree represent more than 95% (n = 67) of the sample. Meanwhile, teachers with postgraduate degrees constituted 4.3% of the survey, and were equally distributed amongst the following schools: 1, 2 and 4.

Table 5.3: Academic qualifications

Qualification	Bachelor's degree	Postgraduate degree
N[9]	67	3
%	94.5	4

5.2.4. Subject speciality of the participants

Through Table 5.4, it is clear that language teachers (i.e., English or Arabic) and science teachers (chemistry, biology, and physics) represent the majority of the

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[9] There were invalid (discarded) data concerning the qualifications of one respondent (teacher) 1.5 %.

participants in this survey with 20% for each subject, totalling 40% of the sample. Teachers of social sciences (sociology, psychology, history and geography) dominated the third rank with 19%, while teachers of religious studies attained fourth rank with 17%. Mathematics teachers were represented by seven teachers with 12%. The next two ranks stand for computing and information science teachers (computing, information resources) and vocational studies teachers (i.e., food technology, textiles and fine arts/drawing) with 7% and 5%, respectively.

Table 5.4: Subject speciality of the participants

Subject	N^{10}/%	School			
		School 1	School 2	School 3	School 4
Language	N	4	3	4	1
	%	33.3	25.0	33.3	8.4
Science	N	3	4	4	1
	%	25.0	33.3	33.3	8.4
Religious studies	N	2	2	2	4
	%	20.0	20.0	20.0	40.0
Social studies	N	1	5	5	0
	%	9.1	45.5	45.5	0.0
Computing and information science	N	1	2	0	1
	%	25.0	50.0	0.0	25.0
Vocational studies	N	0	2	1	0
	%	0.0	66.7	33.3	0.0
Mathematics	N	2	2	1	2
	%	28.6	28.6	14.2	28.6

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[10] There were missing data in terms of subject speciality for 12 teachers.

5.2.5. Teaching experience

The category of teaching experience of between 10-20 years had the highest representation with 68% (48) of all the schools, as School 2 and School 3 had 44% and 25%, respectively, on an individual school level (see Table 5.5). The category of teachers with less than 10 years of experience comes next, with 21% (15); about one-fifth of the total study. School 1 and School 2 represent 80% of this category, with 60% for School 1 and 20% for School 2. The category of the most experienced teachers, with more than 20 years of experience, came in the last rank with 11.3% (8). The largest part of this category is in School 2 with 35% representation, while the smallest part is in School 4 with 17% representation. This category is represented in School 3 and School 1 almost equally with 25% and 23%, respectively. This shows that members of the study are experienced in general, but with variations in the range of experience, as teachers with a small range of experience are represented in the study.

Table 5.5: Teaching experience of the participants

School	N/%	Years of experience		
		< 10	10-20	> 20
School 1	N	9	5	2
	%	56.2	31.3	12.5
School 2	N	3	21	1
	%	12.0	84.0	4.0
School 3	N	2	12	4
	%	11.1	66.7	22.2
School 4	N	1	10	1
	%	8.3	83.4	8.3
Total	**N**	**15**	**48**	**8**

	%	21.1	67.6	11.3

5.2.6. Training Related to Using ICT in Education

Table 5.6 emphasizes that approaching 78 % of the surveyed sample had attended ICT training courses. Furthermore, at least 70 % or more of teachers in each of the four schools were trained, while School 4 had the highest percentage with 83 %. From Figure 5.1, it can be seen that 69% of the sample had two training courses or more, while about half of the sample had taken three courses or more. In more detail, these courses give basic ICT training, including the following: Portal, the Midan System (LMS) in Portal, the basics of computer usage (Internet, printing, Word, PowerPoint, Excel and Access), and Smart Board usage (interactive whiteboard).

Table 5.6: Participation in ICT training courses

| School	N/%	Involved in ICT training
School 1	N	12
	%	75.0
School 2	N	20
	%	80.0
School 3	N	13
	%	72.2
School 4	N	10
	%	83.3
Total	**N**	**55**
	%	**77.5**
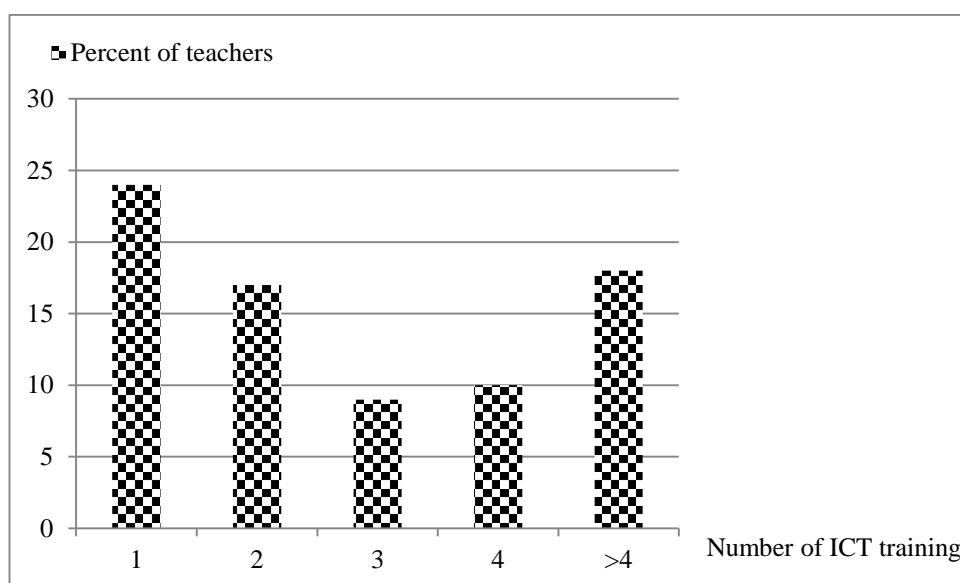
Figure 5.1: Proportion of participants in ICT training courses

5.2.7. Ownership of computers or tablet PCs

Of the sample, 96% owned a personal computer or tablet PC (e.g., iPad). Only three cases from the sample did not own a computer, two of which were in School 1 and one in School 3.

5.2.8. Using the Internet

Only 6% of the sample did not have access to the Internet at home, two of whom owned neither a computer nor an iPad. All of the teachers in the four schools use the Internet apart from one teacher, who was a female from School 3. She had neither access to the Internet nor a computer at home. From Table 5.7, it can be deduced that 57% of the teachers' sample used the Internet always or usually, and about 34% used it sometimes. The smallest percentage is of those who used it rarely (9%). Further, in terms of using the Internet on the school level, 75% of the teachers in School 1, 66% of the teachers in School 4, more than 50% of the teachers in School 2, and 35% in School 3 used the Internet always or usually.

Table 5.7: Use of the Internet by the teachers

N/%	Frequency of using the Internet					
	Never	Rarely	Sometimes	Often	Always	Total
N	1	6	24	15	25	**71**
%	1.4	8.5	34	21	35.1	**100.0**

5.2.9. Types of ICT used by the teachers

Table 5.8 demonstrates the most popular types of ICT (both ICT hardware devices as well as ICT applications software) used by teachers in the sample. In terms of using ICT hardware devices, computers came first with 93% of the surveyed sample, followed by interactive whiteboards (IWB), which constituted 55%, and, finally, iPads equalled 19%. However, concerning the use of ICT applications software, computer programs accounted for 36%, then social networking websites (Facebook and Twitter) stood at 26%. Next, the educational websites reached 23%, followed by electronic encyclopaedias (such as Wikipedia), which represented 15%, afterwards came other ICT applications amounting to 9% (e.g., using the Saudi Ministry of Education website and the Tatweer website), and, lastly, chat websites were used by 4% of the sample.

Table 5.8: Types of ICT used by the teachers

Type of ICT	N of users	% of the total sample
PCs	64	92.7
iPads	13	18.8
IWBs	38	55.1
Computer programs	25	36.2

Online chat rooms (including discussion rooms)	3	4.3
Electronic encyclopaedias	10	14.5
Specialized educational sites	16	23.2
Social networking sites (e.g., Facebook)	18	26.1
Other ICT applications	6	8.7

5.2.10 Portal Use

As shown in Table 5.9, 58% of the teachers in the sample used the Portal (using the Portal was not mandatory). Most use was found in Schools 1 and 2 with 32% usage in each case. School 3 came next with 20%, and School 4 came last with 17%. On a school level, the percentages of teachers using the Portal compared to those who do not use it are as follows: 81%, 58%, 52% and 44% for School 1, School 4, School 2 and School 3, respectively.

Table 5.9: Users of the Portal

School		Users of the Portal
School 1	N	13
	%	81
School 2	N	13
	%	52
School 3	N	8

	%	44
School 4	N	7
	%	58
Total	**N**	**41**
	%	**57.7**

Concerning the frequency of using the Portal, 26% of the teachers in the sample reported that they usually or always use it. However, 46% claimed that they use the Portal sometimes, while 28% reported that they use it rarely. On the school level, teachers who 'sometimes' use the Portal came first with 50% in School 1 and School 2, 43% in School 3, and 38% in School 4. The highest percentage of teachers who 'always' or 'usually' use the Portal was in School 3 with 38%, followed by School 4 with 29%, then School 2 with 25%, and, finally, School 1 with 17%. The percentages of teachers who 'rarely' use the Portal were 33.3%, 29%, 25% and 25% in Schools 1, 4, 2 and 3, respectively (see Table 5.10).

Table 5.10: Frequency of the teachers' Portal usage

School	N/%	Frequency of Portal usage			
		Rarely	Sometimes	Often	Always
School 1	N	4	6	1	1
	%	33.4	50.0	8.3	8.3
School 2	N	3	6	3	0
	%	25.0	50.0	25.0	0.0
School 3	N	2	3	1	2
	%	25.0	37.5	12.5	25.0
School 4	N	2	3	0	2

		28.6	42.8	0.0	28.6
Total[11]	**N**	**11**	**18**	**5**	**5**
	%	**28.2**	**46.2**	**12.8**	**12.8**

5.3 Potential usefulness and acceptance of the Portal

According to Table 5.11, all items expressing the benefits and acceptance of the Portal had high levels of agreement, with mean scores ranging from 3.53 to 4.04 (5 = strongly agree). In more detail, three items scored a mean approaching or above 4.0. These were: the benefit of the Portal in helping teachers to communicate with the students out of school (4.04); the potential of the Portal to support the integration of ICT into the teaching and learning (4.01); and the importance of the Portal in helping to improve the learning process through materials that teachers post on the Portal containing exercises and their answers for the students to use out of the school period (3.97). Furthermore, there were two items that achieved an equivalent mean of 3.89. These were: the Portal facilitating new teaching strategies and the Portal supporting the changes and reformations of the teaching and learning. Finally, four items accomplished a mean score of less than 3.70, making them bottom of the list. These were: the benefit of the Portal in improving the students' skills in solving problems, with a mean of 3.66; the importance of the Portal in buttressing the students' skills in critical thinking (3.65); the importance of the Portal in supporting collaborative learning among the students (3.63); and, finally, the importance of the Portal in preparing for lessons (3.53).

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[11] Out of the 41 participants, two did not specify the frequency of their usage of the Portal.

Table 5.11: Ranked items related to the potential benefits and acceptance of the Portal (mean scores)

Ranked statements (items) The Portal greatly contributes to:	Mean	Std. deviation
1. Communicating with students out of school.	4.04	0.977
2. Supporting the integration of ICT.	4.01	0.876
3. Supporting the learning process out of the school period.	3.97	0.947
4. Improving students' learning skills.	3.94	0.849
5. Increasing self-learning.	3.94	0.883
6. Improving the efficiency of teaching.	3.94	0.968
7. Supporting the teaching process.	3.93	0.840
8. Implementing a strategy of e-learning.	3.93	0.968
9. Contributing to learning materials for teaching some of the school subjects.	3.90	0.995
10. Facilitating new teaching strategies.	3.89	0.894
11. Supporting the changes and reformations of the teaching and learning.	3.89	0.903
12. Supporting the preparation of experimental tests out of the school period.	3.82	0.976
13. Supporting the preparation of homework and announcements out of the school period.	3.81	1.107
14. Improving students' academic achievements.	3.73	0.970
15. Following-up the school curricula.	3.72	0.897
16. Facilitating the learning process.	3.72	1.077
17. Improving students' skills in solving problems.	3.66	0.925
18. Improving students' skills in critical thinking.	3.65	0.958

19. Improving collaborative learning among the students.	3.63	1.018
20. Supporting preparation for lessons.	3.53	1.086

5.4 Key factors influencing implementation of the Portal

The key factors influencing the Portal use are discussed in detail below under two subheadings, the first of which is the relevant factors that affect Portal use according to the teachers' perspective, ranked based on the mean scores for factors. The second subheading discusses the steps which were followed to identify the significant factors that seem to be most powerful in influencing the implementation process of the Portal for the teaching and learning process from the teachers' perspective.

5.4.1 Ranking relevant factors affecting implementation of the Portal

In the light of Table 5.12, all relevant factors (incentives and hindrances) affecting the implementation of the Portal from the teachers' perspective had a mean ranging from 3.50–4.64, i.e., from high agreement to very high agreement. Four factors achieved a very high degree of agreement (a mean score of 4.50 or above). These were: Providing a high-speed Internet connection inside the school (4.64); Technical support of the Portal (4.61); The availability of PCs and Internet access in students' homes (4.61); and Motivation and encouragement of students by the Ministry of Education to use the Portal (4.59). Two factors had a high degree of agreement (a mean score between 4.00-4.20). These were: Disinclination of students for using ICT (4.10), and Parents' strong interaction and enthusiasm towards the Portal (4.09). Finally, the factor relating to the 'Saudi curricula' had a high degree of agreement (3.50), which was the lowest ranking.

Table 5.12: Ranked factors affecting the implementation of the Portal

Ranked relevant factors	Mean	Std. Deviation
1. Unavailability of high-speed Internet connection in schools.	4.64	0.591
2. The limit of the technical support.	4.61	0.669
3. Unavailability of computers and Internet access in students' residences.	4.61	0.727
4. The lack of the technical equipping of classes.	4.60	0.689
5. Lack of motivation and encouragement offered by the Saudi Ministry of Education to teachers and students in terms of using the Portal.	4.59	0.645
6. Dedicating an independent budget to schools for supporting the implementation of the Portal.	4.58	0.715
7. Absence of specialized courses for teachers in designing lessons through the Portal.	4.45	0.733
8. Unavailability of the programs that can aid teaching through the Portal.	4.44	0.788
9. Absence of training programmes for teachers on assessing students' performance through the Portal.	4.43	0.809
10. Availability of dedicated leaderships to manage the Portal pedagogically.	4.40	0.824
11. Cancelling paperwork in teachers' preparation for lessons.	4.37	0.783
12. Teachers not participating in the policy-making procedure of the Portal.	4.30	0.823
13. Some teachers lack sufficient experience and training in using the Portal.	4.23	0.898

14. Disinclination of the students towards using ICT in the process of learning.	4.10	0.965
15. Parents' strong interaction and enthusiasm.	4.09	1.032
16. Most of the teachers follow traditional teaching methods.	3.85	0.995
17. Correspondence between policies of the Portal and Saudi national strategies of ICT integration as well as the new initiatives for Saudi education reform.	3.83	1.021
18. Current Saudi curricula require improvement	3.50	1.113

5.4.2 Identifying the powerful significant factors influencing implementation of the Portal

Two main analytical procedures were conducted: factor analysis and regression analysis in order to classify the influential factors behind implementation of the Portal into key issues. Factor analysis was used to extract the number of the main issues of the factors as well as to distribute the factors among the existing issues. The regression analysis test was implemented to identify the powerful factors in each issue according to the significant contribution of factors in their associated issues, then the significant powerful factors in each issue were used to title the issue.

▪ **Exploratory factor analysis (EFA)**

The EFA test was carried out in three key steps (Fahmi, 2005; Pallant, 2010).The first step was to determine the suitability of the relevant factors that affect the Portal use in Table 5.12 for using the EFA test. For this reason, two tests were applied: the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity. The analysis shows that the value of the KMO test was 0.863 (> 0.600), which had a high sampling adequacy on the one hand, and Bartlett's test of sphericity was significant at the 99% confidence level $p = 0.00$ ($p < 0.01$) on the other. Therefore, the EFA test was appropriate to conduct in this case. The second step was the use of the common extraction method

for the EFA test, which is principal component analysis, to identify the number of issues concerning relevant factors influencing the implementation of the Portal. The analysis indicates that there are four issues (components/ clusters) which explain 70% of the total variance in the relevant factors influencing the implementation of the Portal (see Appendix 5). The final step was rotating the issues; in other words, checking the factor loadings on the issues. The varimax method is commonly applied to contribute effectively to reducing factors that have strong loadings on each issue. There are two special conditions which apply to the use of the varimax rotation method. The factor loadings on the four components (issues) 'should have a value of ≥ 0.30' on the one hand, and 'three items (factors) at least' should load on each issue on the other (Fahmi, 2005:806). Table 5.13 shows the factor loadings on the issues; in more detail, the five factors most strongly loaded (above 0.6) on Issue 1, five factors most strongly loaded (above 0.5) on Issue 2, four factors most strongly loaded (above 0.4) on Issue 3, and only three factors most strongly loaded (above 0.5) on Issue 4. As a result, all the issues and relevant factors in this case were used in the next analytical procedure.

Table 5.13: The issue loadings for each relevant factor influencing the Portal use

Factors	Components (Issues)			
	Issue 1	Issue 2	Issue 3	Issue 4
1. Teachers not participating in the policy-making procedure of the Portal.	0.217	0.595	0.042	0.325
2. Correspondence between policies of the Portal and Saudi national strategies of ICT integration as well as the new initiatives for Saudi education reform.	0.120	0.136	0.806	-0.084
3. Availability of dedicated leaderships to manage the Portal pedagogically.	0.407	0.324	0.475	0.137

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4. Dedicating independent budgets to schools.	0.771	0.315	0.320	0.119
5. Cancelling paperwork in teachers' preparation for lessons.	0.677	0.142	0.474	0.107
6. The limit of the technical support.	.793	0.287	0.251	0.133
7. Unavailability of high-speed Internet connection in the schools.	0.835	0.252	0.084	0.203
8. The lack of technical equipping of classes.	0.792	0.240	0.026	0.044
9. Development of current Saudi curricula.	0.130	-0.173	0.649	0.156
10. Disinclination of the students towards using ICT in learning.	-0.013	0.267	-0.082	0.889
11. Parents' strong interaction and enthusiasm.	0.248	0.026	0.375	0.561
12. The traditional teaching methods.	0.102	0.271	0.752	-0.026
13. Lack of sufficient experience and training in using the Portal.	0.105	0.790	0.262	-0.109
14. Absence of specialized courses for teachers in designing lessons through the Portal.	0.338	0.835	-0.040	0.252
15. Unavailability of the programs that can aid teaching on the Portal.	0.470	0.710	0.120	0.215
16. Absence of training programmes for teachers on assessing students' performance through the Portal.	0.328	0.736	0.128	0.317
17. Unavailability of computers and Internet access in some students' residences.	0.292	0.481	-0.024	0.582

18. Lack of motivation and encouragement offered by the Ministry of Education in using the Portal.	0.512	0.150	0.064	0.581

- **Multiple regression analysis**

Multiple regression is essential to apply for an explanation of the interrelation between factors and their issues, as shown in Table 5.13, before putting an interpretation on the issues. In other words, multiple regression explains the variance in each issue by examining the significant contribution of its relevant factors. The stepwise method is commonly used in multiple regression tests because it is able to present the variance of each issue (component) in various models (Fahmi, 2005). Several key steps were taken in order to try to interpret the SPSS output of the stepwise multiple regression used in this study (Fahmi, 2005; Pallant, 2007). The first step was checking the values and significance of R-Squared (R^2) and for all the models of each issue. The value of R^2 ranges from 0.00 (very low) to 1.00 (very strong) and it should be significant at the 95% confidence level ($P < 0.05$). Then, multiplying the value of R^2 and the figure of 100 is used to express the percentage of the variance of each issue in each model. The second step was checking the value and the significance of the Beta standardized coefficients relating each factor within all the models for each issue. The great value of the Beta coefficient at the significance level ($p < 0.05$) for a factor serves as a reliable indicator, suggesting that this factor has been proved to be highly influential in its issue (Fahmi, 2005). Hence, in this study, the strong (large) value of the Beta coefficients is within the limit: $0.30 \leq x.$ at the significance level ($p < 0.05$), as the factor loading each issue in the EFA test was limited to a value of ≥ 0.30. The third step was to select the best model for each issue that has the highest value and significance of R^2, and only contains factors that have large and significant Beta coefficients. The fourth step was removing the factors in which the Beta coefficients are either a marginal (small) value or insignificant. The fifth step was putting the key significant factors in each issue according to their sequence in the selected model (from the highest to the lowest value of Beta coefficient). The final step was titling the issue through interpreting the key relevant factors.

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In more detail, the analysis shows that the best model for Issue 1 achieved an R^2 of 0.825; $p < 0.001$, which means that the model explained around 83% of the variance in Issue 1 (see Appendix 6). Factors 7, 8 and 4 achieved large (strong) and significant Beta coefficients: 0.403, 0.350 and 0.3, respectively; $p < 0.01$. However, Factor 5 and Factor 6 were excluded automatically from the selected model because they had insignificant Beta coefficients. The powerful significant factors falling under Issue 1 from the largest value of Beta coefficients are as follows:

1) High-speed Internet connection inside the schools.

2) Equipping the classes with technical means that support using the Portal.

3) Separate budgets for the schools to support implementing the Portal Project.

It is clear that the common denominator among these factors is the financial support and infrastructure of the Portal. Hence, this issue can be titled 'financial infrastructure factors'.

The best model for Issue 2 obtained an R^2 of 0.819; $p < 0.001$ (explaining 82% of the variance in Issue 2). Factors 13 and 14 under this issue achieved large and significant Beta coefficients: 0.473 and 0.424, respectively; $p < 0.01$. However, Factor 1 was excluded from this model due to its marginal (small) Beta coefficient ($\beta = 186$). The powerful significant factors falling under Issue 2 from the highest value of Beta coefficients are as mentioned below:

1) Experience and training of the teachers related to the usage of the Portal.

2) Professional training courses for teachers to design lessons through the Portal.

It is clear that the common denominator among these factors is qualifying and training teachers to use the Portal. Therefore, Issue 2 can be labelled 'professional development of teachers factors'.

The best model for Issue 3 had a score of R^2 equal to 0.896; $p < 0.01$ (explaining 90% of the variance in Issue 3). All factors related to this issue achieved large and significant Beta coefficients: Factor 2: 0.487, Factor: 12 0.401, and Factor 9: 0.310; $p < 0.01$. The factors falling under Issue 3 from the most powerful influence are as follows:

1) Linking the policies of the Portal with Saudi national strategies of ICT integration into education as well as new Saudi innovative educational reforms.

2) Teaching methods appropriate for the Portal usage.

3) Developing curricula to meet the implementation of the Portal Project.

It is clear that the common denominator among these three factors of Issue 3 is pedagogical influences on the implementation of the Portal; hence, Issue 3 can be titled 'the pedagogical factors'.

The best model for Issue 4 had a large value of R^2 (0.843; $p < 0.01$).Therefore, this model explains 84% of the variance in Issue 4. Two factors under this Issue reached large and significant Beta coefficients: Factor 10 had a very strong Beta coefficient score of 0.790; $p < 0.01$), and Factor 11 achieved a strong Beta coefficient value of 0.3; $p < 0.01$). However, Factor 17 and Factor 18 were excluded due to their insignificant Beta coefficients. The factors under Issue 4 from the most influential are listed below:

1) Students' tendency to use ICT in the process of learning.

2) Parents' strong interaction and enthusiasm.

It is clear that these two factors concern the motivation of students towards using the Portal, so Issue 4 can be labelled 'motivational factors'.

5.5 Suggestions from teachers for successful implementation of the Portal

In the light of Table 5.14, all suggestions regarding implementation had mean scores ranging from 3.51-4.80, that is, from high agreement to very high agreement. In more detail, 17 suggestions gained very high agreement with a mean ranging from 4.21-5.00. Moreover, four suggestions had a very high degree of agreement (mean score of 4.70 or above). These were: Providing broadband Internet connection with wireless network for schools implementing the Portal (4.80); Providing teachers with specialized training courses through the Portal (4.73); Providing enough PCs with regular maintenance for schools (4.72); and Enhancing the level of training in terms

of the Portal (4.70). Furthermore, three items had a mean between 4.50-4.46. These were: Improving curricula of schools for implementing the Portal to increase the focus on e-activities through the Portal (4.58); Developing the Portal for a user-friendly interface (4.56); and Training school leaders in managing the technical aspects of the Portal (4.56). However, three items had a high agreement with a mean of 4.20–3.40. These include: Combining the Portal usage with the teachers' appraisal (3.83); Making the Portal part of the students' assessment system (3.81); and Mandatory for the teachers to use the Portal (3.51).

Table 5.14: Suggestions for the Portal

Ranked items (suggestions)	Mean	Std. deviation
1. Providing schools with high-speed Internet connections and a wireless network.	4.80	0.435
2. Providing teachers with subject-specific training courses through the Portal.	4.73	0.477
3. Providing enough PCs with regular maintenance for schools.	4.72	0.484
4. Enhancing the level of training in terms of the Portal.	4.70	0.492
5. Providing computer software that suits the Portal.	4.69	0.523
6. Offering teachers and students financial and motivational support.	4.69	0.575
7. Providing teachers with laptop PCs or tablet devices (e.g., iPads).	4.68	0.501
8. Facilitating and clearly communicating policies related to the Portal.	4.61	0.573
9. Appointing an experienced manager for the Portal in each school.	4.61	0.644

10. Improving school curricula for implementing the Portal.	4.58	0.601
11. Developing the Portal for a user-friendly interface.	4.56	0.605
12. Training school leaders in managing the technical aspects of the Portal.	4.56	0.626
13. Integrating the Semanoor[12] Program into the Portal.	4.49	0.609
14. Distributing booklets of the visions, policies and goals of the Portal.	4.42	0.730
15. Fully activating all systems of the Portal.	4.34	0.861
16. Making use of international programmes related to ICT to improve the qualification and training of the Portal users.	4.29	0.919
17. Expanding the implementation of the Portal to all schools in the KSA.	4.21	0.809
18. Combining Portal usage with the teachers' performance appraisal.	3.83	1.393
19. Making the Portal a part of students' performance assessment.	3.81	1.192
20. Mandatory for the teachers to use the Portal.	3.51	1.217

5.6 Differences in the perspectives of teachers regarding the Portal

Four personal characteristics of teachers - gender, Portal use, age group, and frequency of Portal use - were used as dependent variables to examine the differences between the agreement of teachers on all items related to the potential usefulness of the Portal,

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[12] This program complies with the Saudi curricula, and includes interactive pages

the factors affecting implementation of the Portal, and the suggestions for successfully implementing the Portal.

5.6.1 Gender

A t-test was used to examine differences between female and male teachers' perspectives on the potential benefits and acceptance of the Portal, the factors affecting implementation of the Portal, and the suggestions for successfully implementing the Portal. The analysis shows that there were no statistically significant differences between female and male teachers related to their views about the usefulness and acceptance of the Portal or their suggestions for successfully implementing the Portal.

However, in terms of the relevant factors influencing the implementation of the Portal, female teachers had a very strong agreement towards four factors compared with the male teachers, who had strong agreement in this regard. In more detail, female teachers had very strong agreement (with a mean score of 4.22) for the factor relating to Parents' strong interaction with and enthusiasm towards the Portal, while male teachers had strong agreement (with a mean score of 3.60) ($t = -2.107$; $p < 0.05$). In terms of the factor of the Absence of specialized courses for teachers in designing lessons through the Portal, female teachers also reported very strong agreement (mean score of 4.55), whereas male teachers expressed strong agreement (mean score of 4.13) ($t = -2.067$; $p < 0.05$). Moreover, female teachers showed very strong agreement for the factor concerning the Unavailability of the programs which can aid teaching on the Portal (mean score of 4.58), whereas male teachers represented strong agreement on this factor (mean score of 3.94) ($t = -3.044$; $p < 0.05$). Finally, female teachers had very strong agreement on the factor related to the Absence of training programmes for teachers on assessing students' performance through the Portal (mean score of 4.56); at the same time, male teachers had strong agreement in this regard (mean score of 4.00) ($t = -2.503$; $p < 0.05$).

5.6.2 Using the Portal

According to the t-test there were no significant differences between teachers who use or do not use the Portal concerning items relating to the potential benefits and acceptance of the Portal, apart from one item. In more detail, users of the Portal reported very strong agreement (mean score of 4.29) for the item Portal greatly contributes to communicating with students out of school, while non-users expressed strong agreement in this regard (mean score of 3.70) (t = 2.582; p < 0.05). However, the t-test could not reveal that there were significant differences between teachers who use or do not use the Portal in terms of all items related to relevant factors affecting implementation of the Portal.

On the other hand, the t-test showed that there were significant differences between teachers who use or do not use the Portal in terms of three suggestions for successfully implementing the Portal. In more detail, users of the Portal had very strong agreement for the following suggestions from teachers: Making use of international programmes related to ICT to improve the qualification and training of the Portal users; Fully activating all systems of the Portal; and Expanding the implementation of the Portal to all schools in the KSA (with mean scores of 4.50, 461 and 4.41, respectively), whereas non-users reported strong agreement with these suggestions (mean scores of 4.00, 3.97 and 3.93, respectively) (t = 2.323; p < 0.05;   t = 3.325; p < 0.05; and t = 2.573; p < 0.05, respectively).

5.6.3 Age group

According to the one-way ANOVA test, there was no significant difference between teachers of different age groups in terms of their level of agreement for all items in this survey.

5.6.4 Frequency of using the Portal

The one-way ANOVA test revealed that there was no significant difference between teachers with differing frequency of Portal usage in terms of their agreement upon all items in this survey.

5.7 Model of the main issues relating to the factors controlling the success of the implementation of the Portal

This chapter has so far presented analysed data in relation to the factors influencing the implementation of the Portal. Four key issues emerged from the teachers' questionnaire. These issues have a key role in the successful implementation of the Portal (see Figure 5.2). These issues explained a large percentage (about 70%, see Appendix 5) of the cumulative variance of the 18 factors related to the influence on the implementation of the Portal. The four issues are discussed below in order of importance: *financial support and infrastructure, ICT professional development of teachers*, *pedagogy* and *motivation*.
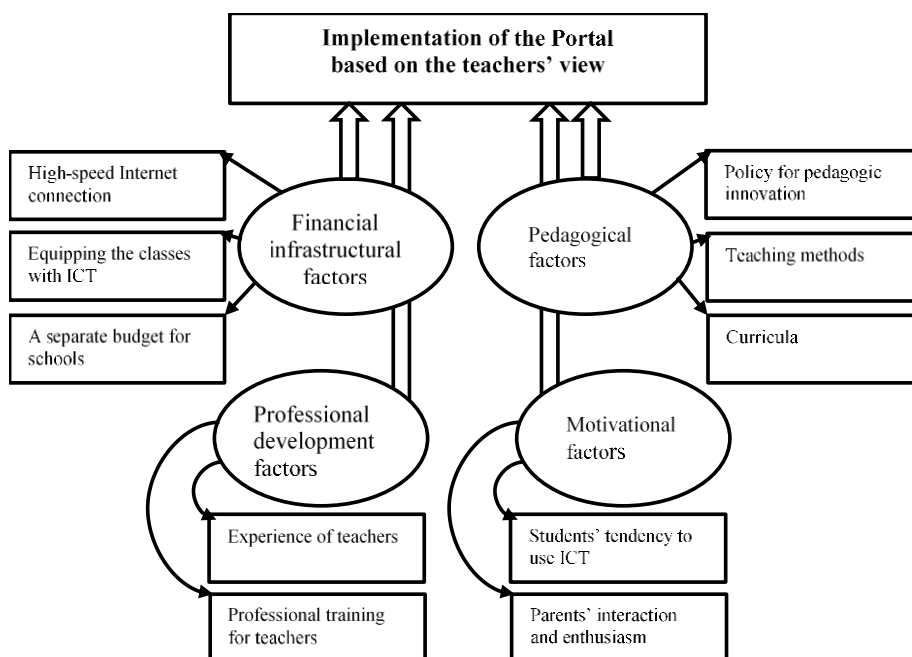
Figure 5.2: Factors influencing implementation of the Portal

First, financial support and infrastructure for the implementation of the Portal accounted for 24% of the total variance in the factors that influenced its successful implementation, while 20% of the total variance also explained that the professional development of teachers was important for the successful implementation of the Portal. Together, financial support and infrastructure and professional development formed 40% of the total variance of the factors that influenced the successful implementation of the Portal. Pedagogy and motivation accounted for 26% of the total variance of the factors influencing the successful implementation of the Portal, with pedagogy alone accounting for 14% and motivation 12%.

The findings are consistent with the suggestions made by the teachers concerning the successful implementation of the Portal. The suggestions included: independent financial support for schools; the provision of infrastructure within the classroom; professional development of teachers; and the pedagogy and motivation of the teachers. However, financial support and the provision of infrastructure were ranked higher and were more frequently suggested by the teachers than the factors of pedagogy and motivation.

5.7.1 Financial and infrastructure support for the implementation of the Portal

On the issue of financial and infrastructure support for the implementation of the Portal, five major factors were present in the first stage of the analyses in this chapter. However, in the second stage of the analyses, two factors were statistically excluded because their relationship to the issue was weak. The first factor that was omitted was the cancelling of paperwork in teachers' preparation of lessons. The second factor to be ruled out was technical support for the implementation of the Portal. It was clear that these two factors were considered closer to motivational support than financial support. In more detail, it was clear that the factor of cancelling paperwork in teachers' preparation of lessons was considered closer to motivational support than financial support as it eased the burden on teachers, but had no direct link with the issue of financial support for the Portal or the necessary technical infrastructure. This remains within the boundary of motivating and stimulating leadership, whether at the school

level or at the level of the Local Authority. Technical support for using the Portal is often associated with financial issues. However, in this study, the schools did not have a substantial budget to provide technical support and, as a result, this factor seemed to be more closely related to the motivational issue.

Three major factors were identified as the bases for the teachers' suggestions regarding the issue of financial and infrastructure support for using the Portal in schools. These factors were: high-speed Internet connection inside schools; equipping classrooms with technical means that support using the Portal; and a separate budget for the schools to support the implementation of the Portal Project. The three factors were comprehensive regarding the issue of financial support and infrastructure for the implementation of the Portal. The analysis showed that the three factors explained more than 83% of the variance involving the factors regarding the implementation of the Portal. It is worth noting that the factors were ranked in terms of importance as follows: access to the Internet; classrooms equipped with technical means; and an independent school budget.

In their suggestions for the implementation of the Portal, the teachers stressed the importance of providing schools with a high-speed Internet connection and a wireless network. This was ranked first in terms of importance amongst all the suggestions. The teachers also stressed the importance of providing enough PCs for schools (this ranked third in terms of importance in the list of the teachers' 20 suggestions), as well as the importance of providing computer software that suits the Portal (this suggestion was the third most important factor in the teachers' list of 20 suggestions. See Table 5.14). However, an independent school budget was not among the teachers' suggestions.

5.7.2 ICT professional development of teachers for the implementation of the Portal

Five factors were also identified in the first phase of the analysis in relation to the issue of ICT professional development for teachers, while in the second phase of the analysis three of the five factors were excluded. The first excluded factor was that teachers were not participating in the policy-making procedure of the Portal; the second factor to be excluded was the unavailability on the Portal of computer programs that could aid

teaching. It was clear that these excluded factors had a weak association with the issue of ICT professional development of teachers. In more detail, the first excluded factor was an organizational one that may be closer to the issue of leadership at the school level or at the level of the Ministry of Education. The second excluded factor was clearly closer to technical means and equipment (the financial issue). Finally, the third excluded factor was the absence of training programmes for teachers on assessing students' performance through the Portal. This indicated that the current use of the Portal is in the trial stage and does not require this type of ICT professional development. In this sense, the teachers' suggestion of making the Portal a part of students' performance assessment was almost ranked lowest (19th out of 20).

Two factors formed the issue of ICT professional development for teachers. The first of the two factors was the experience and training of the teachers in relation to the usage of the Portal. This factor was considered a general factor in terms of training in the usage of the Portal, including both technological and pedagogical knowledge. The second of the two factors was professional training courses for teachers to design lessons through the Portal. This involved specialization in the pedagogical implementation of the Portal. The two factors represented the issue of professional development. They seemed to be comprehensive in many aspects of ICT professional development in terms of the implementation of the Portal in the teaching and learning process. The analysis also showed that the two key factors explained more than 82% of the variance of the special factors relating to the issue of ICT professional development for teachers on the usage of the Portal. However, in their suggestions, the teachers emphasized the importance of pedagogical training in using the Portal. This was the second suggestion in terms of importance. General training on the Portal, which included technological aspects, was ranked fourth in the list of the teachers' suggestions. This meant that the issue of ICT professional development for teachers was considered an obstacle to implementation of the Portal in the experimental stage and needed to be developed.

5.7.3 Pedagogy for the implementation of the Portal

Four factors also accounted for the issue of pedagogy in the first phase of the analysis, while in the second phase, one factor was removed: the availability of dedicated leadership to manage the Portal pedagogically. Despite its importance, this was considered a managerial factor and closer to the issue of leadership, either at the school level or at the level of the Ministry of Education, than an issue of pedagogy. To confirm the importance of this factor, the teachers suggested the appointment of an experienced manager for the Portal in each school.

In terms of the pedagogical use of the Portal, three major factors were identified. These factors, which ranged from high to low in terms of importance, were as follows: linking the policies of the Portal with Saudi national strategies of ICT integration into education, as well as recent Saudi innovative educational reforms. In other words, this factor was concerned with linking innovative educational policies with those of the Portal; the second factor was teaching methods that were appropriate for the Portal; while the third factor singled out the development of the curriculum to fit the Portal Project. These three factors explained approximately 90% of the variance in the factors of the pedagogical issue. The analysis showed less awareness by teachers about these factors, at least in this pilot phase of the Portal. These three factors that shaped this issue came at the end of the list of factors that affected the success of the Portal. The list of teachers' suggestions for the development of the Portal Project did not include any related to pedagogical factors.

5.7.4 Motivation for the implementation of the Portal

Four factors accounted for the issue of the motivation of teachers towards using the Portal in the first phase of the analysis. In the second phase of the analysis, two factors were removed statistically. The first excluded factor was the unavailability of computers and Internet access in some students' residences. This factor had a motivational effect on students in using the Portal, although it did not have a

motivational effect on the teachers. This factor was also ranked high in terms of importance for the teachers. It was ranked third in terms of the list of factors influencing the use of the Portal.

The second excluded factor was the lack of motivation and encouragement offered by the Ministry of Education in using the Portal. This factor was also removed in spite of its association with the issue of motivation towards using the Portal. This was ranked fifth in the list of the most important factors that affected the success of the Portal.

Only two factors formed the issue of motivation for the use of the Portal from the point of view of the teachers. One factor was related to students and the other to the parents. The first factor was the tendency of students to use ICT in learning, and the second was the interaction of parents and their enthusiasm for the Portal Project. These two factors explained 84% of the variance in the factors of the issue of the motivation of teachers for the implementation of the Portal.

5.8 Summary

The current study has revealed that the majority of the teachers in the sample were females between the ages of 25 and 40, all of whom had obtained a Bachelor's degree or higher qualifications. Further, most of the participants had received basic ICT training courses and almost all owned a computer or an iPad and had access to the Internet at home. More than half of the participants used the Portal. Moreover, the Portal received a high level of agreement from teachers in terms of its importance in ICT integration into the teaching and learning process. The benefit of the Portal in helping teachers to communicate with students out of school and the potential of the Portal to support the integration of ICT into teaching and learning received the highest level of teachers' agreement. However, the benefit of the Portal in improving students' skills in solving problems, their skills in critical thinking, and the level of collaborative learning among students had the lowest level of teachers' agreement. The most important suggestions for the successful implementation of the Portal from the

perspective of the teachers were to equip schools with high-speed Internet connections and provide teachers with pedagogical training related to the Portal. Finally, this chapter identified a model for the implementation of the Portal from the teachers' viewpoint. The model consisted of four issues related to factors affecting the implementation of the Portal: financial support and infrastructure, ICT professional development of teachers, pedagogy, and the motivation of teachers.

Chapter Six: Analysis of the Quantitative Data (Students' Survey)

6.1 Introduction

The students' survey analysed in the current chapter is presented under the following five subheadings:

- The personal characteristics of the students, which include gender, training and Portal usage.

- The potential usefulness and acceptance of the Portal.

- Factors affecting the integration of ICT into the learning process through the Portal.

- Students' suggestions on successfully integrating ICT into the learning process through the Portal.

- Differences in the level of agreement on all items related to the potential usefulness and acceptance of the Portal, the factors affecting implementation of the Portal, and suggestions for successfully implementing the Portal.

6.2 Personal characteristics of the participants

6.2.1 Gender

Among the students who responded to the questionnaire, 60% were female (N = 79). The large percentage of female participants is due to the sample being stratified from two all-girls' schools and one all-boys' school.

6.2.2 ICT training

The students were asked whether they had received training related to ICT, to which 92% (N = 106) of the students said they had not gained any ICT training. In more detail, about 97% (N = 45) of the male students had not received training related to

ICT in contrast to 88% (N = 61) of the female students, who also had not been involved in ICT training courses. On the other hand, 8% of the students had attended one or two ICT training courses in which basic computer skills were taught (i.e., word processing, PowerPoint and Excel) and this was provided by the schools in a non-mandatory way after school. Otherwise, no other or more advanced ICT training courses had been attended by any of the students.

6.2.3 Ownership of computers or iPads

All students owned a computer or an iPad. This indicates that the students in the sample had the basic required tools to apply technology in their learning processes. As previously mentioned, a survey was conducted before implementing the Portal Project in these schools to affirm that students use computers at home.

6.2.4 Access to the Internet at home

When the students were asked whether they had Internet access at home, 98% reported they did (Table 6.1). This percentage reflects the likely inclination of these schools to implement the Portal, which fundamentally depends on the availability of the Internet in students' homes. Table 6.1 also shows that the sample has a high level of competency in using technology. Around 85% of the students use the Internet 'Always' or 'Often', consequently only 15% use it 'Sometimes' or 'Rarely'.

Table 6.1: Frequency of using the Internet

Using the Internet	Number (N)	Percentage (%)
Rarely	3	2.7
Sometimes	14	12.4
Often	26	23.0
Always	70	61.9
Total	**113**	**100.0**

6.2.5 Types of technology used by students in learning

Table 6.2 shows the most popular types of ICT used by students anywhere for the purpose of learning. Computers are at the top of the list with 80% of users from the sample, followed by interactive whiteboards with 49%, iPads with 46%, then social networking websites (Facebook and Twitter) with 44%, electronic encyclopedias (such as Wikipedia) with 15%, educational websites come next with 10%, other ICT applications were used by 9.5% of the sample (e.g., the Saudi Ministry of Education website, games and YouTube), and finally chat websites with only 7%.

Table 6.2: Types of ICT used by students

Type of ICT used	Number of users (N)	Percentage (%)
PCs	93	80.8
Interactive whiteboards	56	48.6
iPads	53	46.0
Social networking sites (e.g., Facebook, Twitter)	51	44.3
Computer programs	40	34.7
Electronic encyclopaedias	17	14.7
Specialized educational sites	12	10.4
Other (ICT applications)	11	9.5
Online chat rooms (including discussion rooms)	8	6.9

6.2.6 Using the Portal

In terms of Portal use, 61% of the students in the sample reported using the Portal. This may reflect the fact that using the Portal was voluntary at this experimental stage. For both female and male students, the proportion of users outnumbers the proportion of non-users: 54% and 72% are users, respectively. In terms of the frequency of Portal

usage, 93% of the students who use the Portal stated that they use it 'Rarely' or 'Sometimes', while only 7% claimed that they use it 'Often' (Table 6.3).

Table 6.3: Frequency of students' usage of the Tatweer Educational Portal

Using the Portal	Number/ Percentage	Gender		Total
		Male	Female	
Rarely	N	21	13	34
	%	63.6	35.1	48.6
Sometimes	N	9	22	31
	%	27.3	59.5	44.3
Often	N	3	2	5
	%	9.1	5.4	7.1
Total	**N**	**33**	**37**	**70**

6.3 Potential usefulness and acceptance of the Portal

Table 6.4 shows that all items concerning the potential usefulness and acceptance of the Portal were reflected by a mean of 3.78–3.21, namely from high to medium agreement. In more detail, the following three items achieved a high level of agreement (mean score of 3.63 or above): 'The Portal helps in developing my process of learning through posting materials including explanations of the lessons and exercises by teachers' (3.78); 'The Portal plays a main role in facilitating the process of learning' (3.65); and 'The Portal helps in communication outside school' (3.64). Moreover, two items scored medium agreement (mean score of 3.40), these were: 'The portal facilitates doing homework' and 'The Portal achieves a cooperative environment among students'. Finally, three items achieved medium agreement (mean score of 3.30 or less), which were: 'The Portal increases learning incentives' (3.30); 'The Portal assists self-learning' (3.30); and 'The Portal enhances the students' critical thinking' (3.21).

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Table 6.4: Items ranked according to the potential benefits and acceptance of the Portal

Ranked Statements (Items)	Mean	Std. Deviation
1. The Portal helps in developing the process of learning.	3.78	1.028
2. The Portal facilitates the process of learning.	3.65	0.968
3. The Portal helps in communication outside school.	3.64	1.153
4. The Portal satisfies the desire of students to use technology in learning.	3.62	1.031
5. The Portal supports the curricula.	3.55	0.951
6. The Portal helps in following up subjects.	3.51	1.003
7. The Portal helps students in being partners with teachers in leading the learning process.	3.42	1.084
8. The Portal facilitates doing homework.	3.40	1.134
9. The Portal achieves a cooperative environment among students.	3.40	1.150
10. The Portal contributes to improving the achievements of students.	3.39	1.089
11. The Portal enhances students' problem-solving skills.	3.37	0.984
12. The Portal contributes to developing students' learning skills.	3.35	1.017

13. The Portal contributes to the participation of students in preparing lessons.	3.34	1.079
14. The Portal increases learning incentives.	3.30	1.038
15. The Portal helps in self-learning.	3.30	1.148
16. The Portal enhances the students' critical thinking.	3.21	1.008

6.4 Factors affecting Portal use

6.4.1 Ranking the factors affecting Portal use

Table 6.5 shows that all the factors affecting the implementation of the Portal as perceived by the students had a mean ranging from 4.48 to 3.40, namely, from very high agreement to moderate agreement. Five factors achieved very high agreement (a mean score of 4.21or above), as follows: 'Providing schools with PCs for students as well as computer software' with a mean of 4.48; 'Motivation and encouragement offered by the Saudi Ministry of Education to students in using the Portal' (4.28); 'The availability of computers and Internet access in students' homes' (4.27); 'Experience and training of teachers' (4.25); and 'High-speed Internet connection in schools' (4.24).

Factors which achieved a high degree of agreement with a mean value ranging from 4.00 to 4.20 were as follows: 'Technical support of the Portal' (4.03); 'Preparing students and training them for a sufficient period of time before implementing the Portal Project' (4.02); 'Changing teaching methods to suit the Portal Project' (4.01); 'Teacher encouragement and motivational support for students' (4.03); and 'Technical equipping of classes' (4.11). Finally, the factor related to 'Saudi curricula' achieved a medium degree of agreement with a mean value of 3.40.

Table 6.5: Factors affecting the implementation of the Portal

Ranked Factors	Mean	Std. Deviation
1. Providing schools with PCs for students as well as computer software.	4.48	0.820
2. Motivation and encouragement offered by the Saudi Ministry of Education.	4.28	0.770
3. Availability of computers and Internet access in students' homes.	4.27	0.812
4. Experience and training of teachers.	4.25	0.897
5. High-speed Internet connection in schools.	4.24	0.998
6. Technical equipping of classes.	4.11	1.103
7. Teachers' encouragement and motivational support for students.	4.03	0.837
8. Technical support of the Portal.	4.03	1.004
9. Preparing students and training before implementing the Portal.	4.02	1.026
10. Changing teaching methods to suit the Portal Project.	4.01	0.960
11. Dedicating an independent budget to schools.	3.92	0.839
12. Strong parents' interaction and enthusiasm towards the Portal.	3.92	0.956
13. Disinclination of some students towards using ICT in the process of learning.	3.74	1.140
14. Involving students in the policy-making procedure of the Portal.	3.71	0.975
15. Current Saudi curricula.	3.40	1.154

6.4.2 Classifying factors affecting Portal use in compact issues

In terms of conveniently categorizing factors that influence Portal use under main issues, two main analysis tests were conducted: factor analysis and regression analysis. Factor analysis is used to detect the number of main issues of the factors as well as to distribute the factors among the existing issues. The regression analysis test is implemented to identify the significant factors in each issue according to the significant conurbation of factors in their associated issues, then the significant powerful factors in each issue are used to title the issue (see Chapter 5 for the detailed procedure).

- **Exploratory factor analysis (EFA)**

The EFA test was carried out in several steps. The validity of the items using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test confirmed that the factor analysis is feasible (the KMO test : 0.692 , $p < 0.01$). By using factor analysis, all factors were classified into five issues according to their loadings (above 0.400 for all factors), explaining 60% of the variance as shown in Table 6.6. However, there is one factor under issue 4 and one factor under issue 5 only, so these two issues are not acceptable, in the sense that they contain fewer than three factors (Fahmi, 2005). Hence, they were removed with their associated factors. The remaining three main issues, which explain 46.2% of the variance, were used in the regression analysis test.

Table 6.6: Classifying factors affecting the implementation of the Portal using the factor analysis test

Factor	Components (Issues)				
	Issue1	Issue 2	Issue 3	Issue 4	Issue 5
1. Students' participation in drawing up policies for the Portal.	0.491	0.275	-0.228	-0.320	-0.056

2. Teachers' encouragement and motivational support for students towards the use of the Portal.	0.777	0.112	0.139	0.019	-0.060
3. Dedicating an independent budget to schools for supporting the implementation of the Portal.	0.688	-0.041	0.073	0.066	0.338
4. Technical support of the Portal.	0.727	0.233	0.051	-0.225	0.034
5. High-speed Internet connection in schools.	0.074	0.544	0.066	-0.466	0.414
6. Providing schools with PCs for students as well as computer software.	0.176	0.238	0.672	0.059	0.063
7. Equipping classes with technical means that support using the Portal, such as interactive boards.	0.120	0.051	0.093	-0.037	0.847
8. Current Saudi curricula.	-0.053	0.097	-0.072	0.867	-0.009
9. Preparing students and training them for a sufficient period of time before implementing the Portal Project.	0.194	0.434	0.346	0.157	-0.380
10. Disinclination of some students towards using ICT in the process of learning.	-0.194	0.516	-0.050	0.502	-0.177
11. Strong parents' interaction and enthusiasm towards using the Portal.	0.415	0.384	0.342	0.297	0.011

12. Experience and training of teachers in the usage of the Portal.	0.274	0.779	0.142	-0.080	-0.050
13. Changing teaching methods to suit the project of the Tatweer Educational Portal.	0.153	0.664	0.167	0.172	0.131
14. Availability of computers and Internet access in students' homes.	-0.066	0.055	0.690	-0.186	-0.119
15. Motivation and encouragement offered by the Saudi Ministry of Education to students on using the Portal.	0.064	0.039	0.780	0.023	0.170

▪ **Multiple regression analysis**

Multiple regression was applied in order to re-rank the factors in the main issues (1, 2 and 3), as can be seen in Table 6.6, through examining the significant conurbation of factors in their associated issues. In more detail, issue 1 achieved an R^2 value of 0.891; $p < 0.001$. Factors 2, 3 and 4 had a strongly significant Beta value of 0.434, 0.373 and 0.324, respectively; $p < 0.01$. However, factor 11 was excluded because it had an insignificant correlation with issue 1, as well as factor 1 which was excluded because it had a marginally significant (less than 0.3) influence on category 1 (Beta value: 9.170, $p < 0.01$) (Fahmi, 2005). These factors fall under issue 1 from the highest Beta value, as follows:

1) Teachers' encouragement and support.

2) An independent budget for schools.

3) Technical support of the Portal.

The common elements among the above three factors are the financial and motivational factors.

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The second issue (2) had an R^2 value of 904; $p < 0.001$. Factors 10, 13 and 12 under this issue obtained significant Beta values of 0.443, 0.371 and 0.369, respectively; $p < 0.01$. Factors 5 and 9 were excluded because of their marginally significant (less than 0.3) influence on issue 2 (Beta values: 0.177 and 122, respectively; $p < 0.01$.) The three factors fall under issue 2 from the highest Beta value as follows:

1) Disinclination of students towards using ICT.

2) Changing teaching methods.

3) Experience and training of teachers.

The common notions among these three factors are qualifications and training.

Issues 3 gained an R^2 value of 0.919; $p < 0.001$. All factors representing this issue recorded a strongly significant Beta value: factor 14 ($\beta = 0.481$), factor 15 ($\beta = 0.432$), and factor 6 ($\beta = 0.368$); $p < 0.01$. The items fall under issue 3 from the highest Beta value as follows:

1) Availability of computers and Internet access in students' homes.

2) Motivation and encouragement offered by the Saudi Ministry of Education to students in terms of using the Portal.

3) Providing schools with PCs for students as well as computer software.

The main concern of the above factors is the role they all play as an external influence on the usage of the Portal. Hence, this issue can be known as the external factors.

These three main issues of the factors that affect the implementation of the Tatweer Portal based on students' perceptions according to the above analysis are presented in Figure 6.1
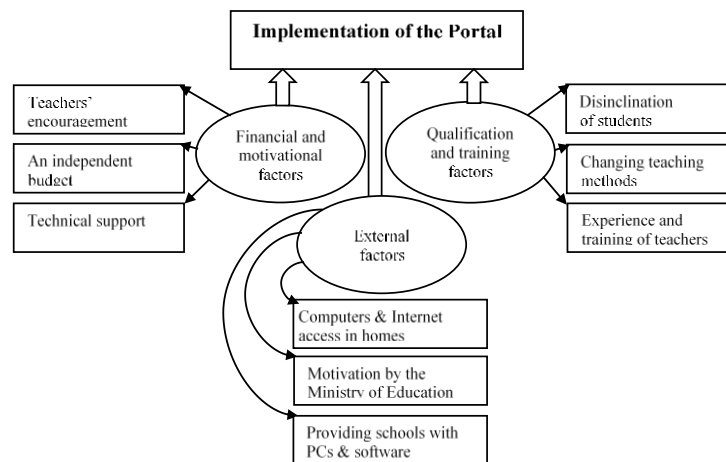
Figure 6.1: Factors influencing the implementation of the Portal

6.5 Suggestions for successfully implementing the Portal

In the light of Table 6.7 below, the items related to students' suggestions for successfully integrating ICT through the Portal into the learning process achieved mean values ranging from 4.64–3.61, namely, from a very high to a high degree of agreement. The items that achieved a very high degree of agreement with a mean value between 4.55–4.64 were as follows: 'Providing schools with electronic classes including interactive boards' (4.64); 'Providing students with PCs or tablet devices (e.g., iPads)' (4.63); 'Allowing students to use their own tablets, laptops or smart phones inside the school as long as they are used for learning purposes' (4.56); and 'Providing schools implementing the Portal with a high-speed Internet connection and a wireless network'(4.55).

Table 6.7: Students' suggestions for successfully implementing the Portal Project

Ranked Items (Suggestions)	Mean	Std. Deviation
1. Facilitating classrooms with the electronic necessities.	4.64	0.533

2. Providing students with PCs or tablet devices (e.g., iPads).	4.63	0.801
3. Allowing students to use their own electronic devices inside the school.	4.56	0.810
4. High-speed Internet connection and wireless network.	4.55	0.799
5. Developing the website of the Portal with a user-friendly interface.	4.45	0.718
6. Offering students financial and motivational support.	4.34	0.963
7. Providing computer software that suits the Portal.	4.32	0.790
8. Fully activating all systems of the Portal.	4.27	0.793
9. Appointing a full-time manager technically qualified to manage the Portal.	4.23	0.902
10. Expanding the implementation of the Portal to all schools in the KSA.	4.22	0.894
11. Enhancing the level of training in terms of the Tatweer Educational Portal.	4.03	0.922
12. Mandatory for teachers to use the Tatweer Educational Portal.	4.00	1.043
13. Integrating the Semanoor[13] program into the Portal.	3.99	0.964
14. Improving school curricula for implementing the Portal.	3.97	0.926
15. Involving students in the policy-making procedure of the Tatweer Educational Portal Project.	3.96	0.844
16. Distributing booklets of the visions, policies and goals of the Portal.	3.81	1.014
17. Making students' assessment through the Portal part of the learning process.	3.61	1.285

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[13] This program complies with the Saudi curricula, and includes interactive pages.

Furthermore, the items that achieved a high degree of agreement with a mean value between 4.00–4.20 were as follows: 'Enhancing the level of training in terms of the Tatweer Educational Portal' (4.03) and 'Mandatory for teachers to use the Tatweer Educational Portal' (4.00). Finally, the item that achieved the lowest mean value and a high degree of agreement is 'Making students' assessment through the Portal part of the learning process' (3.61).

6.6 Differences in students' perspectives regarding the Portal

Three types of characteristics of students (gender, Portal use, and the frequency of Portal use) were used as dependent variables to investigate the differences in students' agreement on all items related to the potential usefulness and acceptance of the Portal, the factors affecting the implementation of the Portal, and suggestions for successfully implementing the Portal.

6.6.1 Gender

A t-test was conducted to examine gender differences for items related to the potential usefulness and acceptance of the Portal, the factors affecting the implementation of the Portal, and suggestions for successfully implementing the Portal. The results show that there were minor differences between male and female students concerning two items related to the potential usefulness of the Portal. In more detail, female students had a strong agreement with the following items: 'The Portal supports the curricula' and 'The Portal helps students in being partners with teachers in leading the learning process', with mean scores of 3.73 and 3.68, respectively, while the male students had medium agreement in this regard with mean scores of 3.27 and 3.20, respectively; $t = -2.547$; $p < 0.05$ (2-tailed) and $t = -3.335$; $p < 0.05$ (2-tailed) for the two items, respectively. Further, the t-test was able to underline a minor difference between female and male students in terms of one suggestion: 'Allowing students to use their own electronic devices inside the school'. However, the t-test revealed that there were no statistically significant differences among students in terms of the factors affecting the implementation of the Portal and suggestions for successfully implementing the Portal.

6.6.2 Using the Portal

A t-test was conducted to examine Portal use differences amongst students for items relating to the potential usefulness and acceptance of the Portal, which revealed there were no significant differences between users' and non-users' agreement levels for these items, with the exception of one item: 'The Portal contributes to the participation of students in preparing lessons'. In more detail, non-users of the Portal had strong agreement, with a mean score of 3.63, whereas users of the Portal reported medium agreement, with a mean score of 3.20; $t = -2.401$; $p < 0.05$ (2-tailed).

Moreover, the test revealed that there was a statistically significant difference between users and non-users for two items in terms of the factors influencing the implementation of the Portal. In more detail, users reported very high agreement for the following item: 'A lack of technical support hinders the implementation of the Portal', with a mean score of 4.21, while non-users had strong agreement in this regard with a mean score of 3.75; $t = 2.287$; $p < 0.05$ (2-tailed).

Likewise, users of the Portal showed high agreement for the item 'Current Saudi curricula hinder using the Portal' (mean score of 3.80), while non-users had a medium degree of agreement (mean score of 3.00); $t = 3.194$; $p < 0.05$ (2-tailed). However, there were no significant differences between users' and non-users' agreement levels for the other factors affecting the implementation of the Portal.

Furthermore, there was a statistically significant difference between users and non-users of the Portal for the suggestion of integrating the Semanoor program into the Portal, in which users had a very high degree of agreement (mean score of 4.21), while non-users had a high degree of agreement (mean score of 3.64); $t = 3.245$; $p < 0.05$ (2-tailed). However, there were no significant differences between users' and non-users' agreement levels for the other items related to suggestions for successfully implementing the Portal.

6.6.3 Frequency of using the Portal

A one-way ANOVA test revealed that there are no significant differences in terms of the frequency of Portal use for all items related to the potential usefulness of the Portal.

In terms of the factors affecting the Portal, the one-way ANOVA test showed there was a statistically significant difference between users of the Portal based on the frequency of their Portal usage for only one factor, which was 'Lack of technical support of the Portal hinders using the Portal', in which those who 'Rarely' use the Portal had a very high level of agreement (mean score of 4.44) compared to those who use the portal 'Sometimes', who showed a high level of agreement (mean score of 3.87) (F-5.340; $p < 0.05$). Furthermore, there were no statistically significant differences in terms of the frequency of Portal use for all items associated with the suggestions for successfully implementing the Tatweer Educational Portal as revealed by the one-way ANOVA test.

6.7 Summary

More than half of the sample were female and are Portal users. The overwhelming majority of the Portal users stated they use it 'Sometimes' or 'Rarely'. All of the students own a computer or a tablet device, and almost all of them have access to the Internet at home with the majority 'Always' or 'Often' using it. Furthermore, the majority of the students had not received any ICT training. Students had a high degree of agreement that the Portal plays a key role in facilitating the process of learning. However, the students had a medium level of agreement that the Portal contributes to developing the learning skills of students and enhancing their critical thinking. According to the analysis, there are three main issues of factors that affect the implementation of the Portal: financial and motivational factors, qualification and training factors, and external school factors. Analysis shows that users had a higher degree of agreement in comparison to non-users concerning the factor relating to the lack of technical support of the Portal hindering its usage. The most important suggestions upon which the students agreed were providing schools with electronic classes and providing students with tablet devices. Finally, users of the Portal had a greater level of agreement in comparison to non-users in relation to the suggestion of 'Integrating the Semanoor program into the Portal'.

Chapter Seven: Discussion

7.1 Introduction

This chapter presents the main findings of the research in the light of the literature on ICT integration into the teaching and learning process in schools reviewed in chapter two. The chapter also draws a close comparison between the findings and the new plans of the Tatweer Project related to the implementation of ICT into the Saudi K-12 educational system, particularly the Tatweer Programme for the New Schools Model (see chapters one and four). This chapter aims to address the study's research questions. Thus, an in-depth discussion is present under the following five main headings in turn:

▪ The development scheme of the Portal Project

▪ Teachers' acceptance of the Portal

▪ Portal acceptance among students

▪ The usefulness of the Portal

▪ A general model for the implementation of the Portal

7.2. The development scheme of the Portal Project

This study has shown that it is not compulsory for teachers and students to use the Portal. This agrees with the study by Pynoo et al. (2012) concerning the KlasCement Portal in the Flemish Region of Belgium, which suggested running new ICT projects, including educational portals, on a purely voluntary basis during a set trial period. The current study has revealed that the voluntary stage offered teachers and students a suitable opportunity to become thoroughly familiar with the Portal. This result is in line with significant findings from the case study by Lindberg and Sahlin (2011) that took place in Swedish upper-secondary schools participating in a European Union-financed collaborative project, which addressed the need of teachers to have

confidence in ICT changes to their pedagogical practice. The current study found that the Tatweer Project did not develop practical guidelines regarding the use of the Portal in the teaching and learning process during the experimental stage of the Portal Project.[14] The Tatweer Project only distributed an instruction leaflet that explained the primary responsibilities of the Tatweer Project, the Ministry of Education, and the district education authorities and schools (including teachers and school leaders) towards the implementation of the Portal in the trial stage. In addition, the Portal systems, especially Midan (the LMS), were accompanied by a comprehensive user's manual.

Consequently, the analysis demonstrated that teachers strongly suggested announcing the educational policies related to Portal usage by providing schools with illustrated booklets of the overall vision and the immediate and ultimately long-term strategic plans of the Portal. The analysis showed that the teachers made a suggestion concerning implementation of the Portal in all schools in the KSA once the problems that had arisen from the implementation of the Portal at the experimental stage had been overcome. The analysis also showed that the students put forward a suggestion that is concerned with making the Portal part of their performance assessment system. This suggestion is consistent with Somekh's (2007) study, which highlighted the critical importance of the integration of ICT into the student assessment system. Moreover, the suggestion is in line with Younie and Leask's study (2013b), which drew attention to the importance of assessing students' learning processes through/with learning platforms (LPs). In addition, the suggestion of combining Portal usage with a formal system of teacher appraisal was included in the teachers' list of suggestions. This result is compatible with Younie and Leask's study (2013a) that recommended that making use of LPs should be part of the performance appraisal system for teachers. Furthermore, the current study shows that the Portal was implemented in 2010, during which time the Tatweer Project was undergoing reforms and the Programme of Development of Saudi Schools, which is currently the core programme in the Tatweer Project because it aims to build a New School Model for Tatweer Schools, was established after the implementation of the Portal. In other

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[14] The Portal is one of the miniature projects and programmes developed by the Tatweer Project.

words, the schools that implemented the Portal during the trial stage were not part of the Programme of Development of Saudi Schools.

However, the Portal Project did not launch an innovative educational scheme to implement the Portal into the teaching and learning process. Further, the analysis of the Portal Project website showed that there were no updates concerning the later stages of the development of the Portal Project, and that the Portal Project aimed at establishing learning portals linked to the website of the Portal for schools in which the Portal was used, but this goal was not achieved. In addition, the Tatweer Programme of Development of Saudi Schools has not elaborated the utilization of the Portal clearly. These unfortunate outcomes seem to be indicators suggesting that the Portal Project is likely to need a timetable of substantial reform in order to fit the new Saudi educational strategy, as well as linking the Portal Project with other Tatweer projects and programmes, especially those concerning ICT implementation in education.

7.3 Teachers' acceptance of the Portal

The analysis showed that teachers have a significant positive tendency towards the Portal, with more than half of the sample of the study using the Portal in their teaching process, although it is not compulsory. In addition, the majority of teachers taking part in the study used the Web-based learning environment in their teaching practice. Furthermore, the systematic analysis indicated that teachers had a sympathetic attitude towards the implementation of the Portal. This greater acceptance appeared through the broad agreement among teachers regarding the importance and benefits of using the Portal in the process of teaching and learning. For example, in the qualitative analysis, there was common consensus among teachers on the importance and benefits of the Portal, especially Midan (the LMS), as the teachers believed very strongly that using the systems of the Portal efficiently would yield the maximum benefits of the Portal in terms of the teaching process. Moreover, there was strong consensus among the teachers in the quantitative analysis regarding the benefits of using the Portal. Hence, the analysis showed that teachers strongly suggested initiating all the systems of the Portal. However, the analysis showed minor differences between teachers who

were users of the Portal and those who were non-users concerning their acceptance of the Portal. The Portal users had a stronger tendency towards using the Portal than teachers who were non-users. For example, Portal users had very high agreement in terms of the suggestion of expanding the implementation of the Portal to all Saudi schools after overcoming all the obstacles in the path of the Portal Project, while non-users showed high agreement. However, this minor difference in this regard does not seem to have affected the outcome of the study in terms of the acceptance of the Portal amongst teachers.

The above result is in agreement with the case study by Almås and Krumsvik (2008) concerning the use of ICT by teachers in technology-rich classrooms in four selected Norwegian upper-secondary leading-edge schools, which found that teachers were highly enthusiastic about adopting the use of ICT in the process of teaching. Likewise, the results of the current study coincide with the analysis of Pynoo et al. (2012) that found that teachers were keen with regard to the use of the KlasCement Portal. This result also agrees with the study by Nasser et al. (2011), which found that the majority of teachers in Qatari independent schools that had implemented K-Net (37 schools) promoted the use of the K-Net Portal, and believed that it had a significant role in the improvement of education.

Furthermore, the outcomes of the current study confirm the research study by Oyaid (2009), which examined teachers' ICT use in 10 Saudi secondary schools in Riyadh in terms of the positive attitude regarding the use of ICT in the process of teaching in the Saudi context. Oyaid noted that ICT use was popular amongst teachers in Saudi high schools (secondary schools). On the other hand, the current study clearly indicates that the Portal has an important role to play in improving the efficiency of teaching, as well as in developing students' learning skills. However, this result is different from that found in the case study by Wikan and Molster (2011) that dealt with the use of ICT in classrooms by teachers in three lower-secondary schools in Norway. Their case study highlighted that the overwhelming majority of the teachers asked did not believe in the critical role of using ICT in improving and enhancing the process of teaching, in spite of their recognition that it had a positive effect.

In terms of the Portal gaining increasing acceptance, the teachers in the current study strongly suggested constructing an 'easy' interface for the Portal. This result is in line

with the study by Wang (2008), which illustrated the importance of designing an easy-to-use interface for Web-based learning environments (e.g., the Portal).

Finally, the analysis indicated there were no significant differences between teachers based on their gender or age in terms of their general acceptance of the Portal. This result conflicts with the findings of Wikan and Molster (2011), who indicated that female teachers and teachers who were in an older age group used ICT less than male as well as younger teachers.

7.4 Portal acceptance among students

The study has shown a positive tendency towards using ICT among the overwhelming majority of the students who participated in this research and used technology in the process of learning. In addition, the study has also shown that most of the students taking part in the survey used the Portal, although it was not compulsory. Moreover, the analysis indicated that students greatly approved of the benefits of using the Portal in facilitating the process of learning, as they believed strongly that the Portal Project played a main role in facilitating the learning process. Furthermore, students recognized that the Portal fulfilled their need to use technology in their everyday learning. However, they claimed that the lack of activation of a number of systems in the Portal, especially the system of virtual classrooms, was likely to reduce their tendency towards using the Portal to any significant extent. Therefore, they proposed the full functioning of the systems of the Portal. They also strongly suggested redesigning the official website of the Portal for greater ease of use.

The result of this study concerning using ICT, including the Portal, in learning conflicts with the study by Nasser et al. (2011) in the Qatari context, which reported that students were not interested in the use of technology in learning and that they did not have a positive attitude towards the use of the K-Net Portal. However, the result of the current study regarding the development of the interfaces of the Portal website is consistent in small part with the study by Nasser et al. (2011), which concluded that Qatari students had the view that the K-Net Portal appealed less to students than educational websites on the Internet, as it only had a few educational advantages.

Finally, the analysis showed that there were no significant gender differences between students concerning their acceptance of the Portal, and there were no differences between students who were Portal users and those who were non-users in this regard. This result is in agreement with the study by Maldonado et al. (2011), in which there were no gender differences amongst Peruvian students in terms of their acceptance regarding using the national educational portal (Peru EDUCA).

7.5 Usefulness of the Portal for the teaching and learning process

The findings have shown that both teachers and students mainly utilized the Portal as a communication channel and as a means of providing learning material. The communication outside school hours took two forms: the first was through the Midan System (LMS) and the second was via the discussion fora. Midan was used for uploading and downloading homework or issuing announcements. The discussion fora are an area whereby information exchange takes place amongst students and teachers. The Portal houses a considerable amount of learning materials that can be accessed via two main routes: the first is through Midan and the second is through the Wiki system. In terms of the Midan System, the teachers upload the lessons and other learning resources onto the Portal, whereas the Wiki system depends upon students' activities in uploading various learning resources. This outcome coincides with the case study by De Smet et al. (2012) concerning the use of an LMS by teachers in 72 Flemish secondary schools, which pointed out that the main usefulness of an LMS is in its informational use, followed by its use in communication. In more detail, De Smet et al. (2012) concluded that the most important uses of the LMS in the informational field were to make announcements and to upload or download learning materials. In the second rank of importance came the use of the LMS in the communicational field, such as students' assessments and chat and discussion fora.

Furthermore, the current study is consistent with a case study conducted by Jewitt et al. (2010) in the UK, which defined 12 main special fields from the benefits that emerged from the effective use of e-learning platforms (portals) and related technologies. These benefits had been clear in at least three out of a total of 12 schools

(six primary and six secondary) included in the survey. The function of the portal in communication and information had achieved the top two ranks, respectively, in terms of usefulness as a means of widening the range of opportunities for communication in order to enhance the learning process at home and as a means of increasing the variety of learning resources.

On the other hand, the analysis in the current study has shown that the Portal was used as a teaching aid in the classroom by teachers to provide students with useful sources of learning materials. However, the teaching process was not managed via the Portal. Further, teachers were not able to provide students with lessons through the Portal, because the system of virtual classrooms had not been activated. Further, both teachers and students thought that the Portal was least useful in the enhancement of students' critical thinking, problem-solving skills and collaborative learning. This was mainly because the Portal was not fully facilitated with the specialized applications that promote these skills. The findings of this study in terms of using the Portal to support teaching agree with the study by Oyaid (2009), which found that teachers in Saudi secondary schools used ICT as a teaching aid, especially in the preparation of their lessons, as well as in presenting information sources such as videos, pictures and audio files.

The analysis demonstrated that there were no gender differences among teachers in terms of the benefits of the Portal. However, the analysis showed that there was a slight difference between teachers who were Portal users and teachers who were non-users in terms of the strength of their agreement about the benefit of the Portal as a communication tool with students outside school hours. The users' agreement (very high) was stronger than that of the non-users (high). This minor difference regarding the strength of the agreement on the current benefit of the Portal amongst teachers (users and non-users) does not seem to have had an impact on the positive view related to the usefulness of the Portal.

On the other hand, the analysis indicated that there were great similarities in the agreement of female and male students about the potential usefulness of the Portal, although there was a slight difference between them regarding two of its benefits. In other words, female students' agreement (high) was stronger than male students'

agreement (medium) concerning the benefit of the Portal in supporting the curricula and in helping students to lead their learning process. Similarly, these minor differences regarding the two benefits do not seem to have had an effect on the positive view concerning the usefulness of the Portal amongst students.

7.6 A general model for the implementation of the Portal

In terms of the literature related to factors that significantly affect the use of ICT, Tondeur et al. (2009:225) indicated that

> this list of factors can't reflect the full complexity of school characteristics ... understanding one element (factor) leads to the necessity to understand the foundation on which that element (factor) rests, which in turn can lead to the discovery of other significant elements (factors).

Thus, two steps were taken in constructing a final general model for the implementation of the Portal, as shown in Figure 7.1. The first step involved returning to the factors in both the teachers' model (Figure 5.2, p.134) and the students' model (Figure 6.1, p.152), in order to identify the relevant factors that would contribute to the final model. The second step also involved the re-classification of the factors of the final model into the main issues that should have a link with the issues raised in chapter four to synthesize the findings of the quantitative data (chapters five and six) with the findings of the qualitative data (chapter four), as shown in Figure 3.1 in chapter three.

In detail, 19 factors related to the success of the implementation of the Portal in the teaching and learning process that were produced in chapters five and six were identified in the first step and reduced to 14 factors. The 19 factors constituted 10 from the teachers' model, as in chapter five, and nine from the students' model, as in chapter six. In terms of the students' model, as in chapter six, there were five factors either matching or capable of integrating with the 10 factors in the teachers' model. There were also four factors pointed out in the students' model which were not included in the teachers' model.
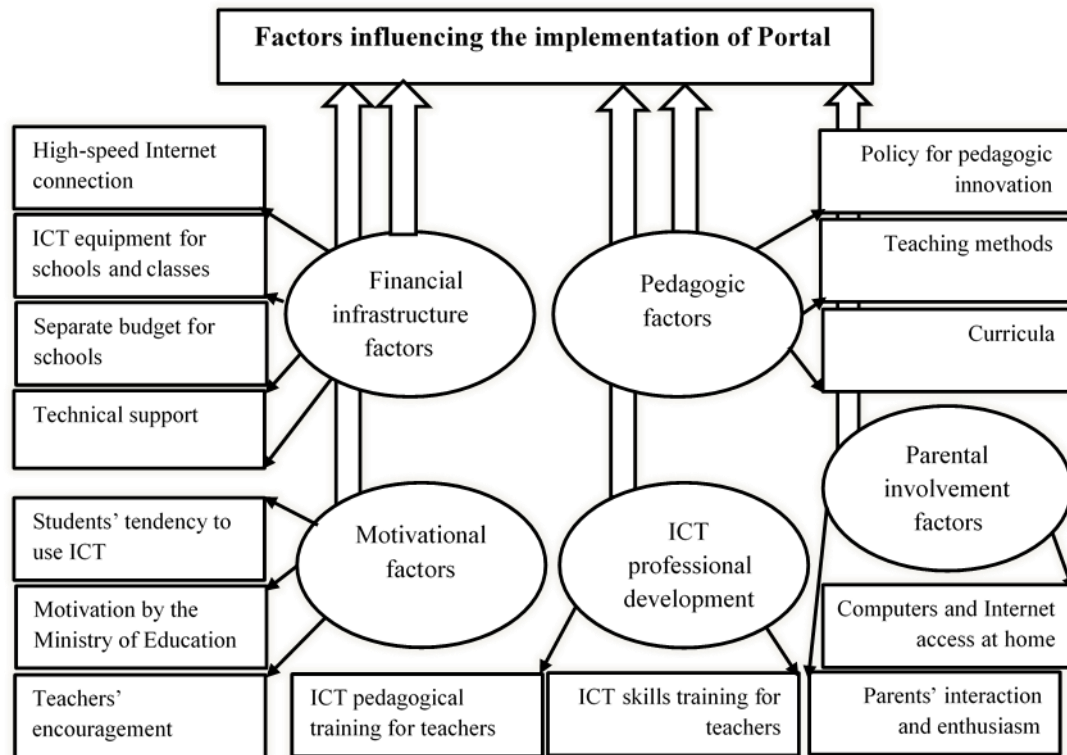
Figure 7.1 : Model for the implementation of the Portal in Tatweer schools

Factors that were not included in the teachers' model, but were mentioned in the students' model, are as follows: motivation by the Saudi Ministry of Education; teachers' encouragement; technical support; and, finally, the availability of computers and Internet facilities in students' homes. These four factors were entered into the final model. The teachers also mentioned the following four factors: the curricula, parents' interaction and enthusiasm, providing schools with Internet facilities, and the pedagogical policies for innovation. These factors were also entered into the final model. Three factors were found to be common to both the teachers' and students' models: teaching methods for teachers; students' tendencies to use ICT; and the allocation of independent budgets for schools. These factors were also included in the final model. Equipping classrooms with adequate technology mentioned in the teachers' model was integrated with equipping schools with technology in the students' model. Hence, equipping schools and classrooms with ICT facilities was also entered in the final model. Finally, the training and experience of teachers in terms of ICT in the students' model was combined with the two factors that were identified under the teachers' ICT professional development issue in the teachers' model. These

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were also entered into the final model. Hence, the total number of factors in the final model was 14.

In the second step, 14 factors were classified in light of the common issues between both teachers and students that resulted from the qualitative data in chapter four in order to identify the most important common issues that would be entered into the final model of factors influencing the use of the Portal. In other words, the 14 factors that emerged from the quantitative analysis were categorized according to the main issues influencing implementation of the Portal that resulted from the qualitative analysis.

In more detail, the 14 factors were classified into five issues. As a result, the six issues influencing the implementation of the Portal that were discussed in chapter four were reduced to five. The most prominent changes in the issues in chapter four were the absence of policies regarding the use of the Portal, the main reason for this perhaps that the Portal Project was in its pilot stage and was being applied for the first time in the KSA. Another change is the aspect of motivation, which was raised as part of the issue of leadership mentioned in chapter four and also became an independent issue from the point of view of teachers as captured in chapter five. In addition, motivation emerged in the students' model as an issue linked with financial aspects. Students also considered that motivation that came from outside the school, especially from the Saudi Ministry of Education, was an external factor influencing the use of the Portal. It seems that the main reason for not repeating the emergence of the issue of leadership in each of the teachers' and students' models was a structural flaw regarding the independence of the schools financially and administratively in the Saudi education system. Another reason why the issue of leadership was not repeated was the absence of middle management, especially subject leaders, as well as subject departments at the school level.

Thirdly, the issue of the infrastructure of the Portal within the school that emerged in chapter four was added to the financial aspects, which were also part of the issue of leadership captured in chapter four. This confirms the strong relationship between the financial aspects and school infrastructure, such as equipment, with respect to the

Portal. Also worth noting is that the teachers' model also included the issues of financial aspects and the infrastructure of the Portal.

Fourthly, the issue of intervention and support from parents contained in chapter four was repeated in the final general model, although it was absent from the responses of the teachers and students as well as from the model. On the other hand, the issues of pedagogy and professional development for teachers that emerged in chapter four were included in the final model, with a note that they were in the teachers' model but absent from the students' model. It is also worth noting that all the issues in the teachers' model in chapter five were included in the final model. The students' model, however, included one issue that was an external factor, and was also a short cut to the issue of the involvement of students' parents in the final general model. These five issues in the final general model are discussed below.

7.6.1 Financial infrastructure factors

The analysis demonstrated that the financial infrastructure factors that influenced the implementation of the Portal were composed of four elements: providing schools with high-speed Internet connections, offering technical support for the use of the Portal, providing schools and classes with ICT that supports Portal usage, such as computers and IWBs, and, finally, providing an independent budget to schools. This result reveals a close similarity to Younie's study (2007:89), which indicated that 'material factors refer to artefacts or equipment, like computers or finance'. In addition, Younie categorized technical support under ICT infrastructure factors. The analysis showed that the degree of financial autonomy of schools was remarkably limited as these factors are controlled by the Saudi Ministry of Education, which has a 'superordinate' role within Saudi schools. This outcome coincides with the study by Oyaid (2009), which indicated that the Saudi Ministry of Education is the main funder of schools in the KSA. This result is also in line with the study by Nasser et al. (2011) in the Qatari context, which found that the Qatari Ministry of the Supreme Council of ICT facilitates Qatari independent schools that implement the Qatari K-Net Portal with equipment and technical support.

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However, this result differs from many studies conducted in the Western context in which schools have considerable autonomy; consequently, the financial infrastructure factors in these studies are dealt with as part of schools' characteristics. For example, in the Irish context, McGarr et al. (2009:97) summarized the role of school leadership in 13 primary schools concerning the management of ICT infrastructure as follows:

> The principals … seemed primarily focused on developing their ICT infrastructure and many had been quite creative and imaginative in finding ways of obtaining ICT resources and technical support.

Moreover, Tondeur et al. (2009), in their study based on a survey of teachers from selected primary schools in Flanders (Belgium), assumed that ICT infrastructure and ICT-related support were characteristic of 'structural schools'. In addition, Vanderlinde and van Braak's study (2010), based on a questionnaire for teachers from selected primary schools in Flanders (Belgium), referred to ICT infrastructure and ICT support as ICT integration related to school conditions. Likewise, in the UK context, the Becta Self-review Framework for the implementation of ICT deals with ICT infrastructure issues as a responsibility that falls on the school leadership (Becta, 2011).

Furthermore, there have been studies carried out in non-Western developed countries that conflict with the results of the current study, as they also link ICT infrastructure factors with school characteristics that are financially managed by school leaders. For instance, Kong (2009) considered ICT infrastructure as the main role of school leadership in Hong Kong. He stated that, 'Schools in Hong Kong have shown determination in their leadership to provide and manage IT infrastructure in response to the trend towards the integration of IT into school education' (Kong, 2009:443).

The New School Model of the Tatweer Project grants schools greater organizational and financial autonomy to make marked improvement in Saudi schools; in other words, this aims to change the role of the centralization of the Saudi Ministry of Education in terms of organizing schools.

The four infrastructure financial factors are discussed in detail below.

- **High-speed Internet**

This study highlighted deep dissatisfaction among teachers and students over the Internet connection in schools, as they thought that a high-speed Internet connection and wireless network were fundamentally important aspects of the successful implementation of the Portal. This result coincides with the study by Way and Webb (2007) in which the importance of the Internet connection was acknowledged, as the study categorized ICT infrastructure level according to the speed of the Internet connection. Hence, the highest level of ICT infrastructure was identified as a 'Multifaceted connected environment', in which all PCs have a high-speed connection to the Internet. Moreover, the outcome of the current study is in line with the UNESCO (2002) model related to the fundamental necessity of networking a whole school with the Internet to achieve the ICT integration process stage. The New School Model of the Tatweer Project promotes the practicality of a high-speed connection with the Internet for all PCs in a school as a basic requirement of ICT infrastructure.

- **Technical support**

The current study considers managing technical support as a financial infrastructure factor, which is in line with the study by Wong et al. (2008:2) that specified technical support as one of the main 'components in the entire cost model of ICT expenses'. Further, this result is similar to the Becta Self-review Framework, which links ICT resources with technical support (Becta, 2011).

The analysis in the current study showed that technical support for the Portal was very limited at the school level; in other words, the Tatweer Project chiefly managed the technical support of the Portal with invaluable contributions from school leaders. Further, students who were Portal users held a very strong negative view about the role of a lack of technical support in the hindrance of the successful implementation of the Portal, while students who were non-users expressed a strong negative view in this regard. In addition, students who 'rarely' used the Portal very strongly defined limited technical support as a great hindrance to implementing the Portal successfully in comparison with students who used the Portal 'sometimes'. However, these minor differences amongst students regarding the factor of technical support do not seem to

have influenced the outcome of this study, as technical support is a significant factor for the implementation of the Portal.

A similar finding emerged from the study by Vanderlinde and van Braak (2010:545), which indicated that good-quality technical support increased the frequency of ICT usage. As a result, the findings of this study include a suggestion, made by both teachers and students, about the crucial importance of appointing a technical manager in each school who is qualified to manage the Portal along with providing technical support for Portal users. This result also bears a significant similarity to Younie and Leask's study (2013a) that found that the local authority (LA) of one school from their case studies had appointed a consultant to provide permanent support for teachers in the school as well as other local schools in relation to the use of the learning platforms.

This outcome also coincides with studies by Lawson and Comber (1999) and Tondeur et al. (2008), which drew attention to the key role of ICT coordinators in providing staff and students with technical support. In the same way, the New School Model of the Tatweer Project identifies ICT coordinators as managers who practise the routine of maintaining the ICT infrastructure, as well as providing technical support for staff and students.

▪ Supplying schools and classes with the necessary ICT equipment

The findings of the current study demonstrate that ICT infrastructure related to the hardware and software in the schools from the study sample is poor in terms of supporting the usage of the Portal. This result is in agreement with the study by Oyaid (2009), which found that Saudi schools lacked ICT equipment. Further, this current study is also in line with that by Selwood and Tang (2007), which recognized the importance of providing schools with a sufficient quantity of high-quality ICT equipment for the successful integration of ICT.

Furthermore, the results showed that teachers strongly suggested equipping classrooms with an adequate amount of electronic devices (e.g., computers and IWBs) and providing personal or tablet PCs. Students also strongly suggested permitting the use of personal electronic devices within the classroom, as they had assumed importance in successfully implementing the Portal. All these opinions relating to

providing ICT equipment occupied the top-ranking suggestions provided by the students. This finding is in line with the study by Pynoo et al. (2012), which demonstrated the importance of providing computers, establishing an Internet connection in classrooms, and encouraging the ownership of a computer by students in order to facilitate the use of the KlasCement Portal. Furthermore, the result of the current study is consistent with the study by Lim (2007), which appreciated the importance of providing classes with the necessary supplies to ensure the effective use of ICT. However, in the New Model for Tatweer Schools, only six classrooms were equipped with an IWB and an Internet-connected computer. According to the results of the current study, this represents a hindrance in the use of the Portal. Although at the initial stage of the establishment of the Tatweer Project an initiative was taken to provide each student with a PC, as well as supplying classes with ICT equipment, this initiative was not taken any further.[15] There is now an initiative to change all classes in Saudi schools to smart classes with the necessary ICT.

Moreover, the analysis underlined the importance of IWBs as essential equipment for the use of the Portal, which confirms the study by Somyürek et al. (2009) that illustrated the role of the IWB in promoting the participation of students in class Web-based activities (e.g., using the LMS in educational portals). Furthermore, the teachers and students in the current study expressed the importance of facilitating the Portal with appropriate software programs that supported the Saudi curriculum, as they suggested integrating the Semanoor Program, which is an Arabic, Saudi curriculum-based commercial interactive program. However, students who were Portal users had stronger agreement with this suggestion than non-users. This result coincides with the study carried out by Özdemir and Kılıç (2007), which proposed that software applications ought to be compatible with the curriculum in terms of their content and language. Moreover, this result has a similarity to Bruntlett's study (2001), which pointed to the valuable role of integrating commercial digital resources, such as the products of Anglia Interactive, into the UK curriculum for enhancement of the e-learning environment.

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[15] See chapter one for more details about Smart Tatweer Schools (STS).

Finally, the analysis indicated that female teachers had a very strong negative view regarding the unavailability of programs that supported teaching via the Portal, in comparison with the male teachers who reported a strong negative view. However, this minor difference does not seem to have influenced the outcome of this study in terms of the importance of equipping schools and classrooms with the necessary programs for the implementation of the Portal.

▪ **Independent budget**

The analysis revealed that schools suffered from a shortage of financial support, and fell short of receiving their budgets directly. As a result, they had not achieved their full requirement of computers, software, and networks. Further, the Saudi Ministry of Education provided schools with computers and software to implement ICT without any follow-up maintenance. This had created obstacles to the integration of ICT into the process of teaching and learning through the Portal. This result is in line with what Oyaid (2009) suggested, in that merely implementing ICT in Saudi schools is not enough. Oyaid believed that the Saudi Ministry of Education ought to offer direction and supervision to schools during the stage of executing a project to use ICT to overcome the financial obstacles, and that the Ministry had put the educational policy for ICT at the disposal of a number of governmental organizations allied with the Ministry of Education. Hence, Oyaid concluded that the Saudi Ministry of Education should give schools sufficient funding and freedom to manage their ICT resources. Furthermore, the current study supports the suggestion of Khosrow-Pour and the Information Resources Management Association in the USA (2002), which was that schools should allocate a fixed budget for their ICT infrastructure. The New School Model of the Tatweer Project provides a separate budget for schools to manage their resources independently according to their need.

7.6.2 Motivational factors

The findings from the current study revealed that there were three motivational factors that acted as a great stimulus to Portal usage: students' tendency to use ICT, the motivation of students by the Saudi Ministry of Education, and teachers'

encouragement of students. In addition, the findings of this current study disclosed the importance of the school leadership in presenting support to encourage and motivate using the Portal in the educational process inside schools.

Further, the current study considered the significance of motivation by the Saudi Ministry of Education in terms of using the Portal. This is what Oyaid (2009) referred to when she stated that encouragement and motivation for ICT use, such as showing appreciation to teachers who used ICT in the educational process in Saudi schools, was an internal issue managed by the school leadership or an external issue managed by the Ministry of Education. She indicated that encouragement and motivation might take many forms, such as praise, monetary rewards, and developing a sense of accomplishment. However, she also claimed that neither the policies of the schools nor those of the Saudi Ministry promoted real motivation. In the New Model for Tatweer Schools, the role of the Saudi Ministry of Education has been identified in developing a package of legislation and policies for a system of incentives in schools. Moreover, the New Model grants leaders of Tatweer schools a high degree of autonomy in formulating action plans aimed at pursuing policies of incentives (Tatweer, 2013).

Furthermore, this outcome of this study conflicts with studies such as those by Yee (2000), Hadjithoma and Karagiorgi (2009) and Vanderlinde and van Braak (2010), which dealt with schools that had greater autonomy. These studies pointed to ICT support as a main role of school leaders in changing cultural school characteristics through encouraging and supporting teachers towards the process of ICT integration.

▪ **Students' tendency to use ICT**

The results of the current study indicated that the Portal supports a student-centred learning process, as successful implementation of the Portal primarily depends on students' usage. The study also revealed that there were no action plans designed to enhance the students' tendency towards ICT usage, although the Portal was implemented through schools. In addition, school leaders did not have a profound role

in influencing students' tendency to use ICT. This result agrees with the study by Nasser et al. (2011:54), which assumed the importance of the role of school leadership in motivating students to use the Portal (K-Net) in independent Qatari schools. They advised that school policy should include developing a system of 'rewards or obligations' to motivate students to use the LMS on the Portal (K-Net) website. Further, the current study serves to emphasize that the deep satisfaction of students in using the Portal is crucially important for its successful implementation. This result is in line with the study by Passey (2010), which suggested that educational portals should be designed to meet the needs of students.

▪ **Teachers' encouragement of students**

This factor reflected the importance of teachers over the motivational support for students, as well as raising the level of acceptance of using the Portal amongst students. This result confirms studies which affirmed the fundamental role of teachers in e-learning as facilitators for students, such as that by Wang (2008). Nonetheless, the results of the present study suggested that a few teachers encouraged students to use the Portal through dedicating marks for using it and identifying its usefulness.

The above finding is in line with Nasser et al. (2011:53), who suggested:

> One possible explanation for low student use of the LMS is the lack of teacher encouragement to use it. Students stated that the use of the LMS tended to be limited to the IT class, which may indicate that teachers do not take advantage of its many features.

▪ **Motivation by the Saudi Ministry of Education**

This study has examined the incentive from the Ministry of Education for Portal usage as a main motivational factor due to the real leadership of the Portal, which was undertaken between the Tatweer Project and the Saudi Ministry of Education. For schools, there was one ICT advisor from the office of the Education District Authority in each city who worked as a coordinator with the Tatweer Project to manage the implementation of the Portal. This study highlighted a lack of motivation from the Tatweer Project and the Saudi Ministry of Education, although there was one motivation method that was employed: an open contest whereby teachers, students and

schools competed in terms of using the Portal and prizes were awarded to the winners. This contest was conducted once at the experimental stage. In addition, the analysis disclosed that there was no incentive scheme by the Saudi Ministry of Education for encouraging the use of the Portal. This result confirms the suggestion of Somekh (2007) of reforming systems of reward to support innovations in schools amongst both teachers and students. Furthermore, this finding is similar to the study by Maldonado et al. (2011), which concluded that there were no policies or projects for encouraging students to use the system of the national electronic education portal (EDUCA) in Peru, so the study advised the creation of strategies by the governmental authorities in Peru aimed at encouraging students to use the portal.

7.6.3 Teachers' professional development factors

The results revealed that there were two factors under the professional development of teachers - ICT skills training and ICT pedagogical training - that reflected their importance in the implementation of ICT through the Portal. Specifically, the results elucidated that the majority of the teachers lacked ICT skills, as they did not receive adequate training. They had only received basic ICT skills training, which involved a week-long course related to the use of the Portal. Teachers also did not undergo any pedagogical training course related to the Portal. This result supports studies that acknowledged the important issue of CPD for the implementation of technological innovation at the school level, such as those by Fullan (1992) and Younie (2007). In addition, this finding is in agreement with many studies which have considered the professional training of teachers, including the two main aspects of ICT skills training and ICT pedagogical training, such as those by Bottino (2003) and Vanderlinde and van Braak (2010). This result is also in line with studies by Lamont (2002) and Oyaid (2009), which stressed that the training offered to teachers should cover ICT skills and ICT pedagogical implementation. Moreover, this finding is similar to Younie and Leask's study (2013a) that found that teachers in their case study schools in the UK requested CPD in both technical skills and pedagogical practice in relation to LPs. Further, the results of this study regarding the importance of the ICT professional development of teachers are confirmed by Wikan and Molster (2011:217), who found:

The teachers who have learned to use ICT as part of a long-term professional development are those who say that ICT might enhance the learning outcome for their students. They therefore use ICT most often and often ask their students to use ICT for homework and presentations.

▪ **ICT skills training for teachers**

The analysis highlighted the importance of training teachers before starting the implementation of the Portal Project. This finding is in agreement with the result from Gobbo and Girardi's study (2001), which found that there was a link between frequency of ICT use amongst teachers and their ICT competence. In addition, this result coincides with the study by Vanderlinde and van Braak (2010), which concluded that ICT professional development includes the stage prior to implementing and using ICT. Therefore, they linked qualifications to experience or teachers' competencies in particular, and concluded the strength of the correlation between teachers' ICT development and teachers' ICT competencies as follows:

> a strong relation between these two latent factors is not surprising as it can be assumed that teachers who participate in ICT related professional development feel more competent in integrating ICT into education. It can also be assumed that such teachers keep up to date with developments in the field of ICT integration (Vanderlinde & van Braak, 2010:549).

Furthermore, based on these results in relation to the current study, sufficient ICT skills training programmes should be designed to be continuous over the long term. This is in line with what has been mentioned by Oyaid (2009), in that ICT training should be 'ongoing'. It is also in line with the study by Nasser et al. (2011), which emphasized the importance of 'refresher courses' in terms of ICT for teachers to understand the features of the Qatari Portal K-Net system. Similarly, this result confirms the study by Wikan and Molster (2011:215) in the Norwegian context, which concluded that short-term courses for ICT projects in general do not have an effective role if compared to continuous long-term ICT training, as they stated that 'The 10 teachers who were given ICT training and support in the classroom when they needed it over a two-year period are much more positive towards the use of ICT and indeed do use ICT more often than the other teachers in the sample'.

- **ICT pedagogical training**

This study emphasizes the importance of providing teachers with ICT pedagogical training related to the Portal. In general, the teachers had very strong agreement regarding the suggestion of providing subject-specific training courses or pedagogical training for using the Portal, as the suggestion ranked second in importance. The female teachers' agreement regarding this suggestion (very high) was stronger than that of the male teachers (high), although both sets of agreement were strong. Hence, this minor difference does not seem to have influenced the outcome of this study.

This result regarding ICT-related pedagogical training confirms what has been suggested by Schibeci et al. (2008:323-324), that ICT professional training for teachers should not focus on ICT skills alone: 'teachers would have benefited from a classroom or personal usage focus throughout, rather than one on technology per se'. Further, this finding agrees with Valcke et al.'s study (2007) that suggested designing ICT training courses for teachers to be focused on ICT pedagogical training. This finding is also consistent with the suggestion by Fragkouli and Hammond (2007) related to focusing on subject-based ICT pedagogical training.

Analysis also revealed that most of the teachers were trained to acquire the skill of using the Portal, but they were not trained to use the Portal in the teaching and learning process, or, in other words, they had no pedagogical skills in relation to the Portal. This finding to some extent mimics what was stated by Becker and Riel (2001, cited in Valanides and Angel, 2005), Kenny (2002) and Selinger (2001) that training related to the integration of ICT in the teaching process had been ignored.

The analysis in the current study also revealed that some teachers helped and supported their colleagues in using the Portal in pedagogy-related tasks, which serves as indirect pedagogical training in the absence of ICT pedagogical leadership in schools (e.g., CICT coordinators or subject leaders),[16] as well as the absence of pedagogical training schemes. This result agrees with the findings by Forte and Flores (2014) concerning the central role of collaboration between teachers at the school level for efficient ICT

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[16] In the New Model of Tatweer Schools there are ICT curriculum coordinators for ICT support, as well as leaders for school subjects for pedagogical support (see chapter four).

implementation in the teaching and learning process. Moreover, this finding confirms the result in Younie and Leask's study (2013a) in relation to effective ICT training conducted by teacher trainers in comparison with that managed by non-teacher trainers, since the teachers preferred to learn from their colleagues. This result is also consistent with Younie (2007), who highlighted the key importance of informal ICT training amongst teachers at the department level in case studies of UK secondary schools for achieving ICT integration. Furthermore, the finding is in line with Leask and Younie's (2013) study, which indicated the central importance of informal collaboration between teachers in a virtual online environment, such as LPs. This is similar to the case study by Hadjithoma and Karagiorgi (2009) carried out in four primary schools in Cyprus with a high use of ICT, which indicated that the majority of the teachers in one school out of four claimed that they received valuable help from their colleagues in terms of using ICT in the classroom.

The New Model for Tatweer Schools was designed to provide continuing training opportunities for teachers. Further, the Tatweer Project has established two main programmes for teacher training. The first is concerned with training newly employed teachers and is a year-long programme. The second programme is concerned with training in-service teachers. However, these programmes are in the early stages and the Tatweer Project has not so far published details, especially regarding their ICT training schemes on the one hand and the link between these programmes and the Portal Project on the other.

7.6.4 Pedagogical factors

The current study took into consideration potential pedagogical factors in the process of the implementation of ICT that consisted of three elements: the policy for pedagogic innovation, teaching methods, and the curricula. Similarly, the study by Wang (2008) identified pedagogy as one of the three key components of a generic model for guiding ICT integration. Alternatively, the result of the current study is in line with the study by Tubin et al. (2003), which took into account the role of the curriculum as a crucial influence upon 'pedagogical innovations'. The current study found that pedagogical influences were strictly limited to teachers. In other words, this result is similar to

studies that limit pedagogical factors to teachers' practice, such as that by Tearle at el. (2004), which focused on pedagogy related to teachers' ICT practice or the study by Schibeci et al. (2008), which made teaching practice the central focus of pedagogy. This finding also confirms the result by Dawes (2001) and Somekh (1997) that teachers have a great responsibility for reorganizing learning activities in relation to ICT implementation.

Furthermore, the current study included policies within the pedagogical factors, in contrast to many studies that categorized policies under organizational factors, such as that by Vanderlinde and van Braak (2010). This is because in the current case study there were no pedagogical policies set at the school level and school leaders were not involved in leading the process of ICT integration, as revealed by the analysis. Further, the analysis showed that the current Saudi school systems do not have a head of department or subject leader. This finding confirms the result by Younie (2007), which indicated that middle-level leaders in her case studies of UK secondary schools, represented by the heads of departments, were considered to be responsible for the success of the integration of ICT into the teaching and learning process.

The three factors related to pedagogy are discussed in detail below.

▪ **Policy for pedagogic innovation**

Based on the analysis, the policies of the Portal were set by the Tatweer Project in coordination with the Saudi Ministry of Education, whereby plans were set first by the supreme leadership and then passed down to schools. Teachers had adopted the view that there was a correlation between the policies of the Portal, the national strategies to integrate ICT in education, and the new initiatives to reform education in the KSA, where they believed that all these policies were integrated. However, the analysis revealed that the schools did not participate in the policy-making procedure, as mentioned previously concerning a lack of school autonomy in the KSA. Similarly, Shaw and Edward (2005, cited in Hadjithoma and Karagiorgi, 2009) suggested that school staff are entitled to participate in ICT policies that involve a long-duration action plan to prevent any misunderstanding on the part of the staff. This result underlines the arguments of Hammond (2014) and Tondeur et al. (2008), which

suggested the major importance of active participation by teachers in formulating ICT policies.

Therefore, the teachers in this study strongly suggested facilitating and clearly communicating policies related to the Portal, as well as acknowledging the importance of providing explanatory material containing its visions, policies and goals. This outcome confirms the study by Oyaid (2009), which reported that teachers in Saudi schools had a lack of awareness about the ICT policies of the Ministry of Education in the KSA, with the result that they faced considerable difficulties in implementing them. However, in the New Model for Tatweer Schools, the ICT policy for pedagogic innovation, including using the Portal, had not been formulated at the time of writing this thesis.

The analysis showed that the Portal Project did not set out - at the trial stage - clear action plans for integrating the Portal into teaching and learning. Further, the analysis revealed that schools did not have a practical plan or strategy to integrate ICT into the teaching and learning process. This result is in line with what had been concluded by Tondeur et al. (2010:305): 'A critical dimension that was missing in most sample schools was the existence of a strategy at the school level that addressed future development and sustainability, and included some means of monitoring progress'. Moreover, this finding agrees with Valcke et al. (2007), who indicated the importance of formulating operational ICT plans at the school level for implementing ICT policies.

▪ **Teaching methods**

The 'teaching methods' factor is considered common in most of the studies which tackled ICT integration, and is discussed under teachers' pedagogical practices. For example, Wang (2008:412) demonstrated this by stating that, 'In an educational context, pedagogy often refers to the teaching strategies, techniques or approaches that teachers use to deliver instruction or facilitate learning'.

The current study has shown that strategies of teaching were not amended to be compatible with the functions of the LMS in the Portal. This finding was in complete agreement with Loveless et al.'s study (2001), which pointed out that teachers often do not change their teaching approach to facilitate technological innovation. This result

is also in line with the study by De Smet et al. (2012), which highlighted the importance of developing good learning strategies that would enable the performance of the functions of the LMS.

Moreover, the analysis for the current study indicated that the teachers believed that integrating the Portal into the process of teaching and learning needed time, especially as the Portal was being applied for the first time in an experimental 'pilot' stage. This result is in line with the study by Schibeci et al. (2008) related to 'an ICT development project' conducted in 12 Australian primary schools, which found that there was inadequate evidence concerning teachers' and students' routine use of ICT. In spite of this, the project was supported by ICT infrastructure, a programme of 'professional ICT development' for teachers, reform of the curriculum, and, finally, teaching strategies to incorporate ICT in the educational process. Hence, the researchers concluded that using technology routinely in teaching students by teachers needed a period of time. The Tatweer Project has not introduced any details about developing the ICT pedagogical practice of teachers, as mentioned above.

▪ Curricula

The analysis indicated that the current Saudi curriculum hinders the successful implementation of the Portal. Students who used the Portal strongly considered the Saudi curriculum as a hindrance to implementing the Portal in comparison with non-users. Hence, the analysis revealed that teachers and students strongly suggested improving the curriculum for the process of implementing the Portal, particularly by facilitating the curriculum with e-learning activities via the Portal. This result is in agreement with the study by Oyaid (2009), which concluded that the Saudi curriculum is in need of development. This result is in agreement with the studies by Cheng and Tam (2007) and Yildirim et al. (2003) in terms of the importance of reforming the curriculum to accommodate ICT implementation.

Further, as mentioned previously (see chapter four), the Tatweer Project adopted the development of the Saudi curriculum and linked it to e-learning as part of its goals. As shown in chapter four, there is an overall project (*Almashro' Ashamal*) that was conducted by the Saudi Ministry of Education to develop Saudi curricula. Furthermore, the Tatweer Project has a programme related to developing educational

digital content sources. However, there is a lack of details about the objectives of this programme.

7.6.5 Parental involvement factors

This study took into consideration that the use of ICT is not limited to school hours. This emphasizes the fundamental role of the school in ICT integration through the Portal in the teaching and learning process and that parental involvement factors are supportive for schools. This study has highlighted that the nature of the Tatweer Portal, as an advanced form of ICT, has been developed to make home a key secondary learning environment which assists the learning process. Hence, this finding is consistent with Somekh (2007), who argued that ICT implementation at the policy level should be extended into students' homes. The current study is also in line with that by Jewitt et al. (2011:343), which identified the home as the main stockholder for schools as follows:

> The use of the LP (Learning Platform) as the main space for independent learning is on the one hand a benefit for learning, and on the other shot through with tensions related to equity, relations between home and school, parental involvement with their child's learning, and access to technology in the home.

Furthermore, the Tatweer Project has revealed the awareness of those in charge of applying the Portal Project in the KSA of the basic importance of the participation of parents in implementing the Portal. This result agrees with many other studies which have examined educational portal projects that involved parents in the implementation (e.g., Jewitt et al., 2010, 2011; Nasser at al., 2011), whereby the analysis disclosed that the schools coordinated with the parents of the students before applying the Portal Project in relation to two issues. The first issue was checking the availability of computers and the Internet in students' homes. The second issue was verifying whether parents allowed their sons and daughters to use the Internet, specifically the Portal website.

The analysis showed that the main use of the Portal was out of school, rather than in school, which is confirmed by what has been mentioned by Jewitt et al. (2011)

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regarding the great importance of creating a partnership between home and school to support the learning process through a portal outside school. The analysis showed that Portal use was limited to teachers and students, although the importance of including the parents in logging into the Portal is referred to by some studies, such as that by Nasser at al. (2011).

Moreover, two parental involvement factors affecting the use of the Portal emerged from the analysis: the availability of computers and Internet access in students' homes, and students' parents' interaction and enthusiasm with regard to using the Portal in the teaching and learning process. These two factors are discussed in detail below.

▪ **Computers and Internet access at home**

The analysis indicated that all the students had computers or iPads at home, and only two students, a male and a female, had no access to the Internet in their home. This result agrees with the study by Jewitt et al. (2010), which found a low proportion of homes not having the necessary supplies (PCs and Internet access) to log into the Web systems of schools. However, this result differs from the findings of the study by Qablan et al. (2009), which found that almost half of the student sample did not have computers, and only a few of the students had access to the Internet. This emphasizes what was addressed in chapter one regarding the ownership of PCs and the dramatic growth of the Internet in the KSA. The analysis revealed that almost half of the students used Facebook, Twitter or both.

In addition, the current study has shown that although the Portal Project is based on the availability of PCs and Internet access in students' homes, there were no initiative projects to support poor students by providing them with free PCs and Internet access at home or facilitating their access to these by adopting endorsing methods such as offering these at a discounted rate, as Pynoo et al. (2012) pointed out in their study. Finally, the non-participation of parents in the Portal Project was the main reason for dismissing the parents as partners in the policy-making procedure of the Portal Project, in spite of their immense significance as shown in the study by Nasser at al. (2011).

- **Parents' interaction and enthusiasm**

The results of this study strongly suggest that there was encouragement by the parents of students to use the Portal, and no single case was reported by teachers or students of parents' refusal to allow any male or female student to log into the Portal. This result differs from that found by Nasser at al. (2011) that some parents had not permitted their children to use the Internet to log into the portal (the K-Net LMS) because they did not trust the content of the Internet, and also due to a misunderstanding regarding parental control over the use of the Internet.

Furthermore, this study has not dealt with the participation of parents in using the Portal because they were not provided with an account to access it. In contrast, the report by Passey et al. (2010) in regard to the implementation of LPs at schools in Wolverhampton in the UK noted that some schools developed facilities in their LPs in response to parents' interest in accessing the portal, and to enhance the involvement of parents in using LPs. Moreover, the analysis showed that no training courses, workshops or attempts to raise the awareness of parents had been held, despite the important role such strategies may have in enhancing parents' approval and enthusiasm towards the Portal Project. For instance, as shown in the study by Nasser at al. (2011), enlightening parents over the issues related to the Portal, such as its safe use, as shown by Jewitt et al. (2010), revealed the non-participation of the parents in drawing up the policies of the Portal Project.

7.7 Summary

The current study has shown that the New Model for Tatweer Schools Programme, which aims at improving the Saudi educational system, has resolved many of the problems that existed during the experimental stage of the Portal Project, such as the absence of a system of incentives at the school level, the lack of school autonomy, and the shortage of training for teachers. There are two main central issues underlining the success of the Portal. The first is the role of the Portal regarding the integration of technology into Saudi education. The second issue regards action plans consisting of the visions and aims for implementing the Portal Project after the trial stage. The current study has revealed that the Tatweer Portal quickly gained acceptance amongst

students and teachers, although they felt it needed sustainable development. The study has also revealed that the Portal was not used to improve the learning skills of students. Moreover, according to the current study, there were minor differences amongst teachers as well as between students in terms of their perception of the Portal based on their personal characteristics, but these differences were trivial. The next chapter outlines the implications of the research findings presented above.

Chapter Eight: Conclusion

8.1 Introduction

This chapter draws the conclusions of this study under six headings:

- The key findings from the current study that address the research questions.
- The contribution of this study to both general ICT policies in school contexts and the practical application of the Portal Project.
- A set of central implications arising from this study for the successful implementation of the Portal Project.
- The key issues that imposed limits on the study.
- Topic areas proposed for future studies relating to ICT implementation in Saudi education.
- Closing remarks.

8.2 The research findings

The outcome of the study relating to the future of the Portal Project is presented at the beginning of this section. A brief summary of the key outcomes of the study is then outlined in relation to the research questions.

8.2.1 The future of the Portal Project

The Portal Project was established in accordance with the Eighth Saudi Five-Year Development Plan as a strategic national educational project. It was aimed at enabling Saudi Arabia to keep pace with strategic planning for the speed of the conversion of Saudi society to an information society in all aspects of life, through the implementation of e-government in all state agencies as well as in the private sector,

such as banks and commercial companies. The project was set up in 2010 and, in its experimental stage, was limited to a few schools in the KSA for one semester in 2011.

At the time of writing this thesis, a long-term plan for the phased implementation of the Portal Project had not yet been released by the Tatweer Project or the Ministry of Education. Furthermore, neither the Tatweer Project nor the Ministry of Education had prepared a future plan for the use of the Portal in the education process after the pilot phase of the Portal Project. Moreover, on the official website of the Portal, there was no available information relating to the essential requirements and standard ICT equipment for the success of the Tatweer Project or any data showing the budget proposals allocated for the Portal. Neither had the currently available information on the Portal website been updated. At the time of the study, it seemed that the Portal Project was being influenced by the temporary freezing of the Tatweer Project to enable a review and redrawing of the objectives of the project based on the new Saudi education strategy for 2010, and it was likely that the new initiatives for the executive programme that had recently been established to reform the Tatweer Project programmes had also had an impact.

Nevertheless, it would seem unlikely that the Portal will be discontinued as it is a national project which is widely related to a lot of the programmes and projects of the Tatweer Project. Hence, there are two possibilities that might explain the discontinuing of the Portal Project in light of the lack of transparency from the Tatweer Project management before reforming the Tatweer Project in 2014. The first possibility is that the Portal has been turned off for review and to plan a proposal for a relaunch. This possibility is considered weak for the reason that the list of new projects and programmes of the Tatweer Project that was updated in 2013 through the Tatweer Holding Company did not include the Portal Project. The second possibility is more reasonable and concerns the leadership of the Tatweer Project holding the view that there are other programmes and projects relating to the larger Tatweer Project that require more urgent consideration in comparison to the Portal Project, since the education system in the KSA is currently witnessing restructuring and an overhaul of some of the problems that used to hinder Saudi educational development. However, the Portal Project seems to be a priority on the agenda of both the new administration

of the Ministry of Education and the newly assigned leadership of the Tatweer Project, as a result of new support from the Saudi Government for the Tatweer Project through launching new initiatives, one of which deals with the full integration of ICT in Saudi education. It is highly likely that, under these new policies and initiatives, the Tatweer Portal Project will be relaunched in the near future.

8.2.2 Factors affecting the implementation of the Portal

In its experimental stage, the Portal Project lacked a sound plan for selecting schools to participate in the trial phase. The selected schools were not among the 50 Smart Tatweer Schools (STSs) that had been equipped with e-infrastructure to be suitable for the pilot stage of the Tatweer programmes and projects, including the Tatweer Portal Project. Further, the selected schools were suffering from poor ICT infrastructure in relation to hardware, software and Internet support for the use of the Portal. In addition, the teachers in the selected schools did not receive formal professional development to ensure effective use of the Portal in the education process (there was only a one-week introductory course in the use of the Portal systems). A special budget for schools in order to address their needs in using the Portal had also not been given.

The study has also shown that there was no development of teaching strategies and approaches commensurate with the aim and objectives of the Portal Project. Finally, the participating schools had no independent authority to manage the teaching and learning process in their schools, so they had not developed policies and plans for the integration of the Portal in the teaching and learning process in the pilot phase of the Portal commensurate with the capabilities of each school. Therefore, the leaders of the schools did not play any prominent role in the implementation of the Portal in their institutions, and the development of the curricula was not consistent with the anticipated use of the Portal. In addition, the motivation from leaders to use the Portal was weak at the school level, as well as among leaders at the level of the Ministry of Education.

Factors that hindered the success of the Portal were initially due to common faults in the Saudi educational system, described by Oyide (2009) as a centralized system in

which the Ministry of Education oversees all the roles of policy formulation and funding, implementation and follow-up, while the schools do not have any lead role in the management of their own education systems. The new education strategy in the KSA seeks to address the most prominent problems in the Saudi educational system, reorganizing the management structure by granting schools full powers to manage their own educational systems. Moreover, the new education strategy in the KSA has redefined the role of the Ministry of Education as focusing on educational policy making and the development of curricula and national educational standards.

The findings of the current study suggest that the Tatweer Project had established a programme dealing with the development of schools that aimed to implement a New Model for Schools, addressing many of the factors that had hindered implementation of the Portal. In addition, the Tatweer Project launched many other developmental programmes and projects that contributed greatly to the success of the Portal Project, such as the Teachers' Training Project and the Digitizing Curriculum Contents Project. However, in contrast with the old system of 50 STSs, the current study detected that there was no clear link between the Portal Project and related Tatweer programmes, specifically, the Tatweer Programme of Development of Schools (a New Model for Schools), which is the core programme in the Tatweer Project; the rest of the Tatweer projects and programmes mainly rely upon the success of the Development of Schools Programme. In more detail, the design of classrooms in the Development of Schools Programme as a model for the new Tatweer schools is completely lacking in the basic equipment for using the Portal, in particular, interactive whiteboards, computers and an appropriate Internet connection. In the model for Tatweer schools, there is one PC, and interactive whiteboards and Internet connections are only available in a limited number of information technology halls (six halls in each school). The model for Tatweer schools also considered the role of LMSs in schools as secondary and, therefore, not essential to the success of the model. In other words, in the model for Tatweer schools, LMSs (such as the Midan System, which is the core system of the Portal) are likely to be used for administrative tasks, such as communication with parents, as well as providing data on the performance of the students, rather than being embedded into the teaching and learning process. Further, the New Model in the Tatweer Development of Schools Programme did not include the implementation of

the Midan System (the LMS) to support the teaching and learning process in Tatweer schools. Thus, the infrastructure in the New Model of Tatweer Schools does not seem to support implementation of the Portal into the teaching and learning, unlike the old system of Smart Tatweer Schools. Hence, the new initiative for ICT integration may lead to a solution for this issue.

8.2.3 Acceptance of the Portal among teachers and students

Although the Portal Project was implemented during a short trial period in Saudi schools, the Portal clearly gained complete acceptance from both teachers and students. This study has shown the widespread use of ICT amongst teachers and students. The study also demonstrates that both the teachers and students who used the Portal were in the majority, even though its usage was voluntary. The study has also shown that teachers believed in the central importance of the Portal in the support of the teaching process, as it represents a practical method for implementing an e-learning strategy. Likewise, students presented the prevailing view that the Portal contributed significantly to facilitating the learning process and promoting self-learning skills.

However, in spite of the potential usefulness of the Portal being commonly acknowledged, neither the teachers nor the students carried a deeply held conviction about the importance of its role in promoting learning skills, such as cooperative learning and learning-based problem solving. A possible explanation for this is that there was a lack of systemic planning in the Portal Project that would facilitate any functioning support of collaborative projects between students, or the linking of school subjects and developing the skills of students in relation to critical thinking and problem solving.

8.2.4 Educational uses of the Portal

This study has shown that the educational uses of the Portal in the trial period could be considered in the context of teaching aids, where the Portal was used inside the classroom by some teachers in order to facilitate the students' understanding of certain lessons. However, the lessons within the classroom were not, in the main, taught using

the Portal. Further, the study found that the Virtual Classroom System within the Portal was not activated in order to explain lessons outside school hours. Furthermore, the Portal was used by students as a valuable learning tool to support and facilitate their learning process. The use of the Portal outside school hours was mostly because its benefit in the classroom was limited. In more detail, the use of the Portal included communication between teachers and students through the LMS (Midan) relating to homework, experimental tests and official announcements for students. Students also used the Portal to submit their homework. In addition, the Portal, through its system of educational fora, offered both students and teachers a number of opportunities to communicate and exchange views outside the classroom. Moreover, the Portal was used through Midan to provide students with useful learning resources, for example, detailed explanations of lessons held in document or audio files or educational videos. Furthermore, the students used the Portal through the (Wiki-based) Tatweer Educational Encyclopedia System to create and share educational resources. However, the Portal was not used to develop a new set of learning skills in critical thinking, solving problems, or linking school subjects to contemporary problems in real life amongst the students.

8.2.5 Improving the effectiveness of the Portal: Teachers' and students' suggestions

The two lists of proposals, one collected from the teachers and the other from the students, concerning the successful implementation of the Portal Project shared certain similarities. Further, both sets of proposals seemed primarily to be linked to weaknesses in the Saudi educational system, which included poor infrastructure to support the use of ICT, poor teacher training in ICT (particularly with regard to the implementing of ICT into the curricula), the lack of a motivational system to support the implementation of ICT, and the need to improve the Saudi curricula and link them with ICT. In more detail, the factors related to supporting the infrastructure came at the forefront of both lists of proposals. These concerned proposals to provide fast Internet speed with a wireless network covering all school facilities, including classrooms; well-equipped classrooms which would support the use of the Portal, especially interactive whiteboards and computers; as well as the provision of computer

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programs that would support the Saudi curriculum and were compatible with the Portal. In this context, the students also strongly advocated the provision of laptop computers or tablet devices (e.g., iPads) to access the Portal in the classroom. Both teachers and students proposed providing teachers with specialist training in the use of the Portal in alignment with the school curricula. The proposals of both groups also included teachers and students being offered motivational support by the Saudi Ministry of Education in the use of the Portal. The teachers also suggested the importance of clarifying and facilitating policies for the integration of the Portal in the teaching and learning process. Strong emphasis was placed by both teachers and students on the allocation of a full-time technically qualified manager to lead the use of the Portal in each school. Further, the teachers and students suggested the importance of both improving Saudi curricula to support the Portal and integrating the Semanoor Program into the systems of the Portal.

8.2.6 Individual differences regarding the Portal

No significant differences were found for age group or for frequency of use of the Portal in relation to teachers' perceptions of its usefulness and benefits, the factors affecting its use or suggestions for improving its effectiveness. There were slight – though non- statistically significant – gender differences between teachers concerning some factors influencing the implementation of the Portal, where female teachers showed the stronger agreement in this regard. There were also minor differences in the strength of agreement among teachers in terms of one item for the potential usefulness of the Portal, as well as three suggestions for the successful implementation of the Portal, where the teachers who were users of the Portal represented stronger agreement in this regard. Nonetheless, these findings did not influence the general outcome of the current study, as the level of agreement of both male and female teachers was generally high across all of these factors.

Similarly, there were some slight differences among the students in their perspective towards implementation of the Portal based on their personal characteristics. For example, students who were users of the Portal were more likely than non-users to suggest that the current Saudi curricula hindered the implementation of the Portal, to

propose the integration of the Semanoor Program into the Portal, and to suggest that a lack of technical support in schools was a great hindrance to its implementation. As with teachers, however, these differences were relatively minor and did not significantly influence the conclusions of this study.

8.3 The significance of the contributions of this study

The current study makes two useful contributions to knowledge. The first is the contribution to designing policies for ICT integration in the educational context, particularly using the Portal in schooling systems for teaching and learning. This study also provides educational decision makers in the KSA with practical potential effective ways forward for the Portal Project. These two main contributions are discussed in detail below.

8.3.1 The contribution to ICT policies

In the Saudi context, the current study represents, at the time of writing, the most up-to-date research into ICT implementation through the Tatweer projects and programmes in accordance with the new Saudi educational strategy, which still seems to be under development. However, previous studies concerning ICT implementation in Saudi schools were either carried out before the launch of the new educational strategy or showed a disregard for the role of the Tatweer Project in relation to the implementation of ICT. As a result, these studies, such as that conducted by Oyaid (2009), mainly focused on long-term problems arising from the existing education system in the KSA. Furthermore, most models of ICT implementation in the relevant literature were not specifically designed for – or derived from studies of – educational portals or web-based LMSs. Therefore, the model in the current study could be valuable for further studies relating to developing policies concerning the Portal in the Saudi education system or educational portals in other contexts.

In more detail, the current study emphasizes a number of critical issues that should be taken into account when introducing educational policies related to the integration of ICT into the process of teaching and learning in schools, especially with regard to

learning platforms. The study mainly underlines the fundamental importance of the independence and autonomy of schools in the success of the implementation of ICT at the school level from two aspects. The first aspect is financial independence, which includes the management and planning of the material needs of schools. This means that schools are likely to be more effective when granted a separate budget to enable them to fund their ICT infrastructure adequately and continuously, provide technical support, support ongoing ICT training for teachers and even students, and offer material motivation for the use of ICT at the school level.

The second aspect is the independence of schools in the management of their teaching and learning systems, in giving schools complete freedom to apply the teaching and learning policies in the implementation of the curriculum, assessment of students' academic performance, and develop plans and strategies for the application of educational policies. This independence will allow schools to integrate ICT in teaching and learning. The results of this study indicate, in this context, that this independence in the management of the teaching and learning process in Saudi schools was missing, thus affecting the success of the implementation of the Portal Project. To clarify, the study found that school leaders had no role in the management of the use of the Portal for pedagogical purposes, where there was a system of educational supervision that managed the pedagogical practice in schools. The study also found that centralized management by the Saudi Ministry of Education and the Saudi Departments of Education in Saudi districts (Local Education Authorities) in supervising the implementation of the curriculum and the assessment of students had a negative impact on the integration of the Portal into the teaching and learning process. In other words, policy makers conceded that school systems occupy a dominant role in the successful implementation of ICT, such as that of the Portal into teaching and learning. Specifically, the present study has shown that the model for the implementation of the Portal in the teaching and learning process is negatively influenced by the characteristics of the current Saudi educational system, in which there is a highly centralized bureaucracy and schools struggle for greater managerial autonomy.

Consequently, the findings of the current study are logically consistent with the clear trend growing in the body of literature in Western educational contexts about the

implementation of ICT in schools, which highlights the essential role of the autonomy of school systems. This trend suggests that a school should be an independent organization when applying government education policies, while the role of educational authorities should be maintained in policy making and monitoring the implementation of these policies by schools. In more detail, the literature raised two orientations for illustrating the relation between ICT integration and the autonomy of school systems. The first links the integration of ICT with school improvement, such as in Vanderlinde and van Braak (2010). The second orientation connects ICT integration with the characteristics of the school system, such as in the studies by Tearle (2004) and Tondeur et al. (2009:224), the latter concluding that 'Previous research often ignored the systemic nature of ICT integration, including the role of school characteristics'. As mentioned above, the new education strategy in the KSA is seeking to achieve the independence of schools and to give schools the powers to enable them to manage their teaching and learning processes, with a limitation set on the role of government education authorities in drawing-up educational policies and following-up application of the policies by schools. However, this strategy is still, at the time of writing, in the stage of development and no detailed information on the application of its plans was available.

Furthermore, the results of the present study suggest the urgent need to build an independent and clear policy for the integration of ICT in the teaching and learning process in the KSA. The current study has shown that the process of using ICT in education in the schools surveyed was subject mainly to the individual efforts of the teachers and that there was no special ICT-related policy concerning curriculum, assessment and teaching methods to support the pedagogical practice of ICT, including Portal usage. Moreover, the findings also showed that there was a lack of continuity in the policies of the implementation of ICT integration. This was evident in the omission of the 50 STSs which were established to be at the core of the implementation of Tatweer programmes, including the Tatweer Portal Project. It seems the main reason for only slight movement in the Tatweer Project was the ongong government changes in the leadership of the Ministry of Education, as well as the Tatweer Project, on the one hand, and the lack of government funding on the other. This situation is similar to the UK context, in which there have been changes in the government agenda which

have reflected the national policy for ICT integration e.g., the shutting down of Becta and the lack of political support, in particular for the use of educational portals in schools (Younie and Leask, 2013a). The results of the current study also confirm the importance of the participation of schools, particularly teachers, in establishing and developing policies related to the integration of ICT in education, as Hammond (2014) indicated that the policies related to the integration of ICT are usually ultimately interpreted by teachers. Therefore, ministries of education are likely to be more effective when they do not ignore the observations and comments of teachers in order for ICT policies to succeed.

The results of this study are consistent with those of Younie (2007) in a number of aspects, in addition to the importance of the autonomy of schools. The current study found that the lack of integration of the Portal in the teaching and learning process was in part due to the absence of qualified educational leadership practice in Saudi schools. The results of the current study show that school head teachers and senior managers had no role in managing the integration of the Portal in the educational practices in their schools. Further, the school system in the KSA lacked heads of departments of school-based subjects leading the teaching and learning process related to their subjects in including ICT integration. This has led to the practice of the Portal becoming a teaching tool at an individual level for teachers, without reaching the level of the integration of the Portal into the teaching and learning process. This is consistent with Younie's (2007) study regarding the importance of departments in secondary schools in the integration of ICT in teaching practice. Younie (2007) found that successful ICT integration was mainly achieved through the pedagogical practices of teachers at the departmental level, not at the individual teacher level. Therefore, her study confirmed the importance of heads of departments in leading pedagogical practice for ICT. The new strategy for education in the KSA noted the importance of the appointment of senior teachers in schools, but the strategy has not addressed establishing departments for school subject in secondary schools.

Despite the current study examining the factors influencing the use of ICT in education from the teachers' viewpoint in much the same way as Younie (2007) did, the results showed that the issues that formed the model of the factors affecting Portal

implementation from the point of view of the teachers differed in terms of importance during ICT implementation as follows: the infrastructural and financial issue came first, the issue of ICT professional training came second, the pedagogical issue was third, and the motivational issue was in the final position. However, Younie (2007) found that the factors affecting the implementation of ICT from the point of view of teachers were characterized as dynamic, whereby the factors affect each other and can be initiated with any one of them when implementing ICT in education. The difference in the context of the two studies in terms of the availability of ICT policies is that ICT policies were present in the UK but not in the KSA, which seems to have led to this variability in the results of the two studies. In other words, whilst ICT policies are still in the process of being established in the KSA, they were already being applied in the UK. This means that the current study considers giving priority during building the policies of ICT implementation to infrastructure in the first instance, then continuous attention to ICT training, later the focus is on the pedagogical aspect and, finally, on the motivational issue.

In spite of the similarity between the current study and that of Younie (2007) concerning the most influential issues for ICT integration in schools, which include training, motivation, pedagogic practice, the curriculum and infrastructure, the issue of the involvement of parents is only present in the current study. The current study highlights the importance of avoiding the restriction of ICT policies to school hours on the one hand, and dealing with ICT policies for both the process of teaching and the process of learning on the other.

8.3.2 Practical contributions of the study

The current study makes practical contributions to decision makers in the Saudi Ministry of Education as well as the Tatweer Project by addressing three vital issues regarding the Portal Project. Firstly, the findings of the study serve to draw the attention of Saudi educational policy makers as well as keen observers of Saudi educational development, whether academics, experienced professionals, or ordinary Saudi citizens who are parents of students, in order to deal with the Portal as a national project that is regarded as a strategic necessity for ICT integration in Saudi education.

Moreover, the Portal is fully consistent with the national policy of the KSA for the implementation of ICT in all aspects of daily life for all Saudi citizens, whereby the Portal Project had the aim of creating a close link between schools and their communities, especially parents.

Secondly, the Portal Project has not – at the time of writing – extended beyond the trial period, and it also seems that no long-term action plan had been formulated when this phase was initiated. More recently, the policies of the Tatweer Project have undergone a process of substantial revision in the light of the new Saudi educational strategy and new initiatives for the Tatweer Project. Hence, this study has demonstrated to the leadership of the Tatweer Project the urgent need to restart the Portal and set out an overall strategy – commensurate with this national plan – for developing the use of the Portal, drawing upon the outcomes of the trial stage discussed in this study. Further, it is likely that Tatweer policies would be crucial in linking all relevant Tatweer programmes related to the implementation of ICT in Saudi education with the Portal Project in order to channel all efforts into the implementation of ICT.

Finally, this study may have practical value for the leadership of the Tatweer Programme of Development of Schools, which deals with the implementation of the New Model for Tatweer Schools from three beneficial aspects. Firstly, there is an urgent need to redefine the role of the Portal Project as a critical element in the New Model for Tatweer Schools. Secondly, there is a strategic necessity to shift the usage of ICT in the New Model for Tatweer Schools from administrative to educational purposes. The third aspect is that the use of the LMS (Midan) for the Portal in the New Model for Tatweer Schools seems to be a strong stimulant of educational innovation in Tatweer schools.

A list of detailed practical recommendations is presented below for the consideration of decision makers in Saudi education in light of the outcome of the implementation of the Portal at the trial stage.

8.4 Implications of the current study findings

8.4.1 Policies of the Portal Project

Potential implications for the policies of the Portal Project based on the findings of the current study are given below.

Policy makers may wish to consider the following:

- The policies of the Portal Project being subjected to extensive revision to meet the new objectives of the Tatweer Project on the one hand and to adopt the Saudi education strategy on the other.
- The Tatweer Project could consider announcing an overall strategy for the Portal Project that consists of both long- and short-term aims. In addition, the strategy of the Portal could fully define the roles of the Ministry of Education and the Tatweer Project.
- It may be possible for the Portal Project to allow the parents of students to access the Portal. This could be done, especially by the Midan System, through personal accounts, since the study has shown that the use of the Portal is currently limited to school staff and students.
- All the Tatweer projects and programmes concerning ICT implementation in education, such as the digital content of curricula, the e-schools programme and the electronic school management programme, could be connected with the Portal Project.
- The Tatweer Project might consider not delaying the official launch of the e-schools programme on the one hand and the Tatweer Project on the other, leading to the rapid establishment of a special educational portal for each school.
- It should be possible to link the various school portals to a national portal and include an LMS system that supports Midan.
- The Tatweer Project could consider extending the trial period for the Portal Project to provide teachers, students and parents with sufficient opportunity to explore the full advantages of the Portal.
- Before adoption of the use of the Portal as a mandatory official daily duty for schools, the formal systems for the performance assessment of students, the

performance appraisal of teachers, and incentives for teachers and students could be reviewed in order to finalize the implementation of the Portal into the teaching and learning.

- An aid programme could be offered to provide students from poor families with PCs and an Internet connection to support the home use of the Portal through long-term and interest-free loans.

- It would be useful to review the development scheme of the Portal, for example, every two years.

- The formulation of effective pedagogic strategies for the use of the Portal in the teaching and learning process could be usefully undertaken.

School leaders may wish to consider the following:

- Creating a clear plan and a coherent strategy for applying policies for integrating the Portal into the teaching and learning process.

- Integration of Portal usage with the whole school policy in terms of ICT usage.

- Updating the Tatweer Project with feedback on the policies of the Portal.

Teachers might want to consider the following:

- Participation in developing the policies of the Portal effectively.

- Providing school leaders with continuous comments and feedback about hindrances to Portal usage.

- Developing new teaching strategies that match Portal usage.

Students may wish to consider the following:

- Participation in developing the policies of the Portal effectively.

- Providing their schools with feedback in terms of using the Portal.

8.4.2 The official website of the Portal Project

The major implications based on the results of this study regarding the website of the Portal are listed below.

Policy makers may wish to consider the following:

- Setting up new systems in the Portal to enable the educational development of students' skills in collaborative learning, solving problems and critical thinking through joint projects between students that are based on linking curriculum subjects.
- Providing an official website address for special school portals as hyperlinks in the website of the Portal.
- Redesigning the website of the Portal to be used as a standard model for the special portals of schools.
- Offering schools professional support services in terms of using educational portals in the teaching and learning process.
- Enabling the website of the Portal to support a user interface in English.

Teachers and students may wish to consider the following:

- Activating their emails and personal sites on the Portal website.
- Regular and effective participation in all activities on the Portal.
- Providing valuable suggestions that lead to developing the Portal website.

8.4.3 Management of the use of the Portal in schools

The principal specific implications regarding managing the implementation of the Portal in schools are summarized below.

Policy makers may wish to consider the following:

- The formation of a creative team to manage the use of the Portal in each school. The team should be led by a full-time manager who has valuable experience in implementing ICT into education. This team is likely to be most effective if it includes the school's Information Technology or Computing teacher.
- Schools could be granted a generous budget for the implementation of the Portal, the development of their special portals, and for providing technical support.

- The Tatweer Project may wish to consider being responsible for the provision of continued technical support to schools.

School leaders may wish to consider the following:

- Providing adequate funds to ensure effective use of the Portal.
- Ensuring all teachers and students receive timely support.

8.4.4 ICT infrastructure for Portal usage

The main implications relating to an ICT infrastructure that supports the use of the Portal by schools are given in detail below.

Policy makers may wish to consider the following:

- Equipping all classrooms in schools with the necessary ICT infrastructure for successful implementation of the Portal; for example, the provision of PCs for each student, a high-speed Internet connection (broadband), and an interactive whiteboard for each class.
- Provision of a wireless Internet connection in all school buildings.
- Provision of a laptop computer or tablet device for every student and teacher in order to use the Portal as a central part of the teaching and learning process.
- Provision of software applications that support the use of the Portal, such as Microsoft Office.
- Ensuring that integration of the programs complies with the Saudi curricula, such as the Semanoor Program, in the Portal.

Parents of students may wish to consider the following:
- Providing their children with the right software and equipment, ranging from PCs to laptops, etc. to facilitate the usage of the Portal at home.
- Installing a fast Internet connection.
- Encouraging their children to use the Portal.
- Being cooperative with the school regarding their children's usage of the Portal.

8.4.5 Curriculum

The findings of this study offer possible implications for developing the Saudi curriculum to meet the requirements for the implementation of the Portal.

Policy makers may wish to consider the following:

- Making rapid improvement in the digital content of the curriculum (there is a Tatweer Project in this regard) and connecting the curriculum with the Portal.
- Teaching the systems of the Portal, especially the Midan LMS, within the IT curriculum in order to assist students in using the Portal in the learning process effectively. The IT curriculum is currently subject to considerable revision.
- Linking the systems of the Portal with classroom or extra-curricular activities in all curriculum subjects in the interests of stimulating integration of the Portal into the process of teaching and learning.
- Connecting the various curriculum subjects through collaborative projects between students that are carried out through the Portal.

8.4.6 Pedagogical practice

The current study suggests the following possible practical implications for pedagogical practice that match Portal usage.

School leaders may wish to consider the following:
- Developing plans for applying pedagogical practice through Portal usage.
- Making Portal usage a part of the appraisal of teachers.
- Supporting using the Portal to assess students' performance.
- Supporting using the Portal in cooperative projects across school subjects.

Teachers may wish to consider the following:
- Integrating the Portal into their pedagogical practice in classrooms.
- Developing new teaching strategies that fit using the Portal.

- Encouraging students to use the Portal in cooperative projects across school subjects.
- Conducting the assessment of students through the Portal.
- Supporting students in their use of the Portal in the learning process.

8.4.7 Training

This study offers the following practical suggestions for the development of training related to the Portal.

Policy makers may wish to consider the following:

- The Tatweer Project holding regular skills development training workshops in schools for teachers in order to assist them in integrating the Portal into their curriculum subjects.
- Providing pedagogical training for teachers on teaching strategies that are much more convenient for the implementation of the Portal.
- Carrying out a function on the website of the Portal that enables teachers to share their successful practical experiences with other teachers in terms of the use of the Portal, such as interesting lessons, useful teaching materials and new teaching methods.
- Providing special teams for managing the Portal and providing subject leaders in schools with advanced, professional and long-term training in all the systems of the Portal, including technical and pedagogical aspects related to its use, to allow them to act effectively as expert advisers in their schools, as well as to participate later in training teachers.

Teachers may wish to consider the following:
- Supporting informal cooperative training with other teachers in their schools or teachers in other schools.
- Providing students with the necessary training to use the Portal.

Students may wish to consider the following:

- Improving their skills in using the Portal at an advanced level.
- Supporting informal training with other students.

8.5 Limits of the study

This study has had some limits imposed upon it due to circumstances beyond the researcher's control. One important limitation to this study was the fact that the Portal was a new project that had been implemented in Saudi education for the first time within a limited trial period. This procedural matter has had possible implications for a lack of experience in using the Portal Project amongst teachers and students. Moreover, while this study was being conducted, the leadership of the Tatweer Project was subject to dramatic changes; a new Saudi educational strategy was also adopted. Consequently, the Tatweer Project has undergone a process of fundamental revision. The initiative of 50 pilot Smart Tatweer Schools, which had standard ICT equipment to meet all Tatweer programmes and projects, was then decommissioned. This placed an important limitation on this study as the Portal Project was planned to be implemented in the STSs. Instead, the implementation of the Portal took place in selected schools which lacked the ICT infrastructure to support the use of the Portal. In addition, a lack of up-to-date and detailed information on the further progress of projects and programmes belonging to the Tatweer projects, especially the Tatweer Programme of Development of Schools, which is the main programme in the Tatweer Project, imposed a serious limitation on this study. For example, the information on the official websites of the Tatweer Project, the Portal Project and the other Tatweer projects and programmes has not been continuously and properly updated.

Finally, only a small number of schools were involved in the implementation of the Portal Project. For example, in the Education Department in Riyadh, the capital city of the KSA, only four schools had the opportunity to participate in the Portal Project. This led to another limitation on this study, as the number of possible respondents in the study survey was finite.

8.6 Proposed topics for future studies

The central theme of this study is the implementation of the Portal as a national educational project. The Portal is an advanced form of technology that enables users to apply almost all types of ICT. Hence, the Portal systems are aimed at facilitating the integration of ICT in the teaching and learning process in schools in the KSA, particularly through the Midan LMS. Accordingly, this study proposes shifting the central focus of future studies in an attempt to investigate the integration of ICT in the teaching and learning process in the Saudi schooling system and to study the LMSs that are used in Saudi schools, such as the Midan System in the Portal, as LMSs can bring about greater integration of ICT in the teaching and learning process. This study also suggests a number of topics which have emerged from its findings. These subjects have a significant relationship with the integration of ICT into the teaching and learning process in the Saudi education system. Further, there is a strong need to fill the gap in the literature on ICT integration in the Saudi educational context through conducting in-depth research to cover the areas of these topics. These topics, in order of importance (in the view of the researcher), are as follows:

- The implementation of the Portal Project in schools that belong to the Education Departments in the Saudi administrative districts, excluding the Education Department in Riyadh which was covered by this study.
- ICT integration using the LMS in Tatweer schools that participated in the Tatweer Programme of Development of Schools (New Model of Tatweer Schools).
- The e-school project that is adopted by the Tatweer Project.
- Applying a confirmatory factor analysis test to re-examine the model relating to factors influencing implementation of the Portal which was built in this study through the use of an exploratory factor analysis test in another educational context.

8.7 Closing remarks

The Portal is a national project, which was created in 2010 in order to be essential to the rest of the programmes and projects of the Tatweer Project concerning implementing ICT in the Saudi education system. As a result, it is generally supposed that the Portal Project was launched in the spirit of a long-term strategy, rather than implementing it through only a short trial period. The Portal Project was not closely tied to the Tatweer Programme of Development of Schools, which is the basis for all Tatweer projects and programmes. The Portal is also not linked to the Tatweer programmes and projects relating to ICT implementation in Saudi schools, such as the e-school project. Moreover, the Portal Project, especially Midan (the LMS), should give schools a solid basis for adopting their own LMSs, as well as setting up their own educational portals linked to the Portal website.

Furthermore, Tatweer is a national project which is of interest to the public, so it would be appropriate to make a wealth of information available about all aspects related to Saudi educational development on the official website of the Tatweer Portal and the websites of the projects and programmes belonging to the Tatweer Project. Finally, teachers, students and parents in the KSA are more willing than ever to apply the LMSs through the Portal Project, as well as the special educational portals of schools. However, the most important step should be taken by the leadership of the Tatweer Project in giving top priority to the Portal Project in terms of funding for Tatweer projects and programmes.

Appendices

Appendix 1: Simple structure for the interviews with the schoolteachers and senior managers

__Interview__   *No:*

Date: **Time:**

The main reason for this interview

This study is aimed at building a model for the implementation of the Tatweer Portal in Saudi schools , as the title is: Integration of ICT into the Teaching and Learning Process (Case Study of Saudi Schools Implementing the Tatweer Educational Portal). In addition, the main purpose of this interview is to carry out an extensive investigation into the integration of ICT into the teaching and learning process through the Tatweer Educational Portal. Therefore, your opinions and the depth of your educational experience will greatly contribute to building the model for implementation of the Tatweer Portal in order to be employed later in schools that implement the Tatweer Educational Portal. This interview has three parts: the employment of ICT integration into the teaching and learning process by use of the Tatweer Educational Portal in your school; stimuli and hindrances to the integration of ICT into the teaching and learning process by use of the Tatweer Educational Portal in your school; and your suggestions as to what is required to achieve successful ICT integration into the teaching and learning process in schools that implement the Tatweer Educational Portal.

Ethical considerations

I look forward to your participation in my interview with your constructive response. Your answers will be confidential and will only be used for purposes of scientific research. Further, your name will be replaced by a code number. Please accept my sincere thanks in advance for your cooperation in serving this research.

Interviewer:

Wusmyah Binothman - PhD student at the School of Education, University of Leicester, UK.

Interviewee:

Code number:

Qualifications:

Position:

Your ICT training:

i. *The employment of ICT integration in schools that implement the Tatweer Educational Portal*

1. What is the infrastructure (hardware, software and networks of ICT) that is mainly used in your school for the integration of ICT into the teaching and learning process through the Tatweer Educational Portal? How was this infrastructure employed in your school to design the following:
   - Smart school building?
   - Activity rooms and training rooms?
   - Smart library?
   - Smart classroom?

- Smart laboratories and virtual laboratories?

In addition, what are the future developmental plans in this regard? Is there a laptop for each student and teacher in your school? If your answer is no, do teachers and students in your school have their own personal computers and is there any problem in this regard? Is your school connected to high-speed broadband? Does your school have a local network?

2. How was the ICT integration implemented in the process of teaching and learning in your school via the Tatweer Educational Portal in terms of changes in your school curriculum relating to:
- Curriculum aims?
- Curriculum content (building curriculum materials, knowledge content, design, style of presentation, activities, assessment, images and shapes)?
- The digital format of curricula (such as different versions on the web, iPads, etc.)?
- Educational resources such as interactive links, which includes extra learning resources (videos, audio clips, illustrations, etc.)?
- Electronic teaching aids that accompany curricula materials (Instructional Presentations: "Classroom Presentations Toolkit"), which are e-learning lessons used by teachers in their classrooms daily when necessary and depend upon the techniques of electronic presentations with medium interactivity, and use advanced techniques in PowerPoint and other similar programs?
- Extracurricular activities?

3. How was the ICT integration implemented in the learning process in your school through the Tatweer Educational Portal to change your pedagogic practice in order to improve the effectiveness of your teaching in terms of:
- Planning and preparing lessons such as the use of instructional classroom presentations?
- The use of ICT integration through the Tatweer Educational Portal as a means of stimulating interaction with students in the classroom?

- The use of ICT integration as a means to communicate with students outside the classroom, such as providing students with feedback to improve their performance?
- The use of ICT integration as a source for learning to improve the effectiveness of teaching?
- The use of ICT integration to train students in skills of active learning?
- The use of ICT integration to monitor the implementation of the curriculum?
- The use of ICT integration to achieve new teaching strategies?

4. How was the ICT integration implemented in the learning process in your school through the Tatweer Educational Portal to change your teaching practice in order to improve the effectiveness of your students' learning in order to achieve the following objectives:
   - Learning based on the student (self-learning or student-centred learning) and an increase in motivation towards learning amongst students?
   - Promoting the love of exploration and research?
   - Supporting a collaborative learning environment?
   - Strengthening the learning that is linked to real life, such as the linking of curricula with each other through joint projects carried out by a group of students from one class within a school, different classes within a school, or groups of students that are formed from several classes in different schools, where the Tatweer Educational Portal contributes to facilitating coordination and communication between team members who work on these projects?
   - Promoting learning through fieldwork among students (learners) by the use of technical connectivity with their natural environment through the Tatweer Educational Portal?

5. How was the ICT integration implemented in the learning and teaching process in your school through the Tatweer Educational Portal in order to change your

performance of assessment methods of students to achieve the following objectives:

- Fitting the integration of ICT into educational practices?
- Reflecting the changes in ICT integration to the school curricula?
- The use of assessment methods based on ICT, e.g., e-mail, interactive whiteboards and video conferencing?

6. How was ICT integration into the process of teaching and learning in your school implemented through the Tatweer Educational Portal to change extra-curricular activities such as:
   - The design of web pages for interactive activities at the school sites or the Tatweer Educational Portal?
   - The use of radio and TV in the Tatweer Educational Portal?
   - Chat rooms?
   - Web blogs?
   - International and Arabic websites, especially international and Arabic encyclopedias (Wikis) on the Tatweer Educational Portal?
   - Virtual conferences?
   - Electronic journals?
   - Electronic portfolios?
   - Fora in the Tatweer Educational Portal?

   If there are other examples, please mention them in detail.

7. How would you describe your use of the Tatweer Educational Portal at the classroom level and the after-school level in terms of the frequency of your use, your favorite programs on the Tatweer Educational Portal, and the purposes of your use of the Tatweer Educational Portal?

8. Do you think that the teaching and learning process in your school is actively managed through the Tatweer Educational Portal or is the Tatweer Educational Portal in your school still used as a teaching aid? Please write your explanation in detail.

9. How can you describe your use of ICT resources including ICT devices, programs and the Internet in your school at the class level and after-school level in terms of the frequency of your use and your favourite ICT resources and their types?

10. Would you like to add any further point that you think is related to this dimension (the employment of ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school)?

ii. ***Stimuli and hindrances to the integration of ICT into the teaching and learning process in schools that implement the Tatweer Educational Portal***

1. How do you assess the training programmes for ICT integration into the teaching and learning process through the Tatweer Educational Portal that are provided for staff in your school in relation to the following aspects:
   - Are the training programmes in your school available in sufficient quantity?
   - Do they satisfy the needs and desires of schoolteachers for professional skills?
   - Do they satisfy the needs and desires of schoolteachers to integrate ICT into the teaching and learning process?
   - Do they satisfy the needs and desires of senior managers to lead the integration of ICT at the school level?

2. How would you describe the policies of ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school in terms of the following elements:

   - What is the level of involvement of teachers in the design of policies of ICT integration into the teaching and learning through the Tatweer Educational Portal in your school?

- What is the vision of the policies for ICT integration into the teaching and learning through the Tatweer Educational Portal in your school?

- What are the realistic goals of the policies for ICT integration into the teaching and learning through the Tatweer Educational Portal in your school?

- What practicable means are there for achieving the policies for ICT integration into the teaching and learning through the Tatweer Educational Portal in your school?

- Is there a link between the policies for ICT integration into the teaching and learning through the Tatweer Educational Portal in your school and national ICT strategies, and fresh initiatives related to educational reform in the KSA?

3. How would you assess the leadership of ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school in terms of the following factors:

   - Strengthening the beliefs and attitudes of teachers and students towards the integration of ICT into the teaching and learning process through the Tatweer Educational Portal in your school?

   - Motivating teachers and students for the integration of ICT into the teaching and learning process through the Tatweer Educational Portal in your school?

   - Supporting the integration of ICT into the teaching and learning process through the Tatweer Educational Portal in your school?

   - The distribution of the leadership of the integration of ICT into the teaching and learning process through the Tatweer Educational Portal in your school?

   - Senior managers' involvement in the integration of ICT into the teaching and learning process through the Tatweer Educational Portal in your school?

4. What are the means of technical support and control regarding ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school?

    - Is there a special centre for technical support that is connected to the Tatweer Project electronically? If there is, what are its main duties?

    - Is there an engineer for technical support in your school? What are her/his main duties? What are her/his qualifications?

5. How would you describe your accessibility to the Tatweer Educational Portal in your school at the class level and after school in terms of easy access, equal access, unlimited access, and the distribution pattern of the ICT resources in your school?

6. What are the factors related to your school curricula that hinder ICT integration into the teaching and learning process through the Tatweer Educational Portal?

7. What are the factors related to your pedagogic practice for improving the effectiveness of your students' learning practice that hinder ICT integration into the teaching and learning process through the Tatweer Educational Portal?

8. What are the factors related to your pedagogic practice for enhancing the effectiveness of your teaching practice that hinder ICT integration into the teaching process through the Tatweer Educational Portal in your school?

9. What are the factors related to the assessment of students' learning that hinder ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school?

10. Would you like to add any other factor that may hinder ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school?

11. Would you like to suggest any factor that may stimulate ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school?

iii. *Your suggestions in order to achieve successful ICT integration into the teaching and learning process through the Tatweer Educational Portal in terms of the following elements:*

1. Devices for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

2. Programs for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

3. Networks for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

4. Leadership of ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

5. Policies for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

6. Training for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

7. Changes to curricula for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

8. Changes to the pedagogic practice of teachers for ICT integration into the teaching process through the Tatweer Educational Portal in your school.

9. Changes to the educational practice of students for ICT integration into the learning process through the Tatweer Educational Portal in your school.

10. Changes to the assessment of students for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

11. Would you like to add any further suggestions?

....

....

Thanks for your cooperation.

Appendix 2: Simple structure for the interviews (focus group) with students

The interviews (focus group) in the school of ……..

Date: **Time:**

The main reason for this interview

This study is aimed at building a model for the implementation of the Tatweer Portal in Saudi schools, and its title is: Integration of ICT into the teaching and learning process (a case study of Saudi schools that implement the Tatweer Educational Portal). In addition, the main purpose of this interview is to carry out an extensive investigation into the integration of ICT into the teaching and learning process through the Tatweer Educational Portal. Therefore, your opinions will greatly contribute to building the model for the implementation of the Tatweer Portal in order to employ it later in schools that implement the Tatweer Educational Portal. This interview has three parts: (i) the employment of ICT integration into the teaching and learning process by use of the Tatweer Educational Portal in your school; (ii) stimuli and hindrances to the integration of ICT into the learning process by use of the Tatweer Educational Portal in your school; and (iii) your suggestions for achieving successful ICT integration into the teaching and learning process in schools that implement the Tatweer Educational Portal.

Ethical considerations

I look forward to your participation in my interview with your constructive response. Your answers will be confidential and will only be used for purposes of scientific

research. Please accept my sincere thanks in advance for your cooperation in serving this research.

<u>Interviewer</u>

Wusmyah Binothman - PhD student at the School of Education, University of Leicester, UK

iv. ***<u>The employment of ICT integration in schools that implement the Tatweer Educational Portal</u>***

1. Are students in your school given a personal computer? If not, do students in your school have their own personal computers and is there any problem in this regard? Is your school connected to high-speed broadband? Do you have the Internet in your home?

2. How was the ICT integration implemented in the process of learning in your school via the Tatweer Educational Portal in terms of changes to your school curricula regarding:

   - Curriculum content (building curriculum materials, knowledge content, design, style of presentation, activities, assessment, images and shapes)?
   - The digital format of the curricula (such as different versions on the web, iPad, etc.)?
   - Educational resources such as interactive links which include extra learning resources (videos, audio clips, illustrations, etc.)?
   - Electronic teaching aids that accompany curriculum materials (instructional presentations such as the "Classroom Presentations Toolkit", which are e-learning lessons used by teachers in their classrooms daily when necessary; they depend upon the techniques of electronic presentations with medium interactivity which uses advanced techniques in PowerPoint and other similar programs)?

- Extracurricular activities?

3. How was the ICT integration implemented in the learning process by your teachers in your school through the Tatweer Educational Portal to change your educational practice in order to improve the effectiveness of your learning through the following:
   - The use of ICT integration into the learning process through the Tatweer Educational Portal as a means of stimulating interaction with students in the classroom?
   - The use of ICT integration as a means of communicating with students outside the classroom (after-school), such as providing students with feedback to improve their performance?
   - The use of ICT integration as a source for learning?
   - The use of ICT integration to train students in skills of active learning?
   - Enhancing learning based on the student (self-learning or student-centred learning) and an increase in motivation towards learning?
   - Promoting love of exploration and research?
   - Creating a collaborative learning environment?

4. How was the ICT integration implemented in the learning process in your school through the Tatweer Educational Portal to change the performance assessment methods of students to achieve the following objectives:
   - Fitting the integration of ICT into educational practices?
   - Reflecting changes in ICT integration in the school curricula?
   - Use of assessment methods based on ICT e.g., e-mail, interactive whiteboards and video conferencing?

5. How was ICT integration into the process of learning in your school implemented through the Tatweer Educational Portal to change extra-curricular activities, such as:
   - The design of web pages for interactive activities at the school sites or the Tatweer Educational Portal?
   - The use of radio and TV with the Tatweer Educational Portal?
   - Chat rooms?

- Blogs (web logs)?
- International and Arab websites, especially international and Arabic encyclopedias (wikis) on the Tatweer Educational Portal?
- Virtual conferences?
- Electronic journals?
- Electronic portfolios?
- Fora in the Tatweer Educational Portal?

If there are other examples, please mention them in detail.

6. How would you describe your use of the Tatweer Educational Portal at the classroom level and after-school level in terms of the frequency of your use of the Tatweer Educational Portal, your favourite programs on the Tatweer Educational Portal, and the purposes of your use of the Tatweer Educational Portal, such as:
   - Homework?
   - Exam practice?
   - Review of learning resources?
   - Participation in fora in the Tatweer Educational Portal?
   - Other (please mention them).

7. Do you think that the learning process in your school is actively managed through the Tatweer Educational Portal or is the Tatweer Educational Portal in your school still used as a teaching aid? Please write your explanation in detail.

8. How would you describe your use of ICT resources, including ICT devices, programs and the Internet in your school at the class level and after-school level in terms of the frequency of your use and your favourite ICT resources and their types?

9. Would you like to add any further point that you think is related to this dimension (employment of ICT integration through the Tatweer Educational Portal in your school)?

v. **_Stimuli and hindrances to the integration of ICT into the learning process in schools that implement the Tatweer Education Portal_**

1.How would you assess the training programmes for ICT integration into the learning process through the Tatweer Educational Portal that are provided for students in your school in terms of the following aspects:

- Are the training programmes in your school available in sufficient quantities?
- Do they satisfy the needs of students?

2. How would you assess the leadership of ICT integration into the learning process through the Tatweer Educational Portal in your school in terms of the following factors:

- Strengthening beliefs and attitudes of students towards the integration of ICT into the learning process through the Tatweer Educational Portal in your school?
- Motivating students for the integration of ICT into the learning process through the Tatweer Educational Portal in your school?
- Supporting the integration of ICT into the learning process through the Tatweer Educational Portal in your school?

3. What are the means of technical support and control regarding ICT integration into the learning process through the Tatweer Educational Portal in your school?

4. How would you describe your accessibility to the Tatweer Educational Portal in your school at the class level and the after-school level in terms of easy access?

5. What are the factors related to your school curricula that hinder ICT integration into the learning process through the Tatweer Educational Portal in your school?

6. What are the factors related to your learning practice that hinder ICT integration into the learning process through the Tatweer Educational Portal?

7. What are the factors related to the teaching practice of your teachers that hinder ICT integration into the learning process through the Tatweer Educational Portal in your school?

8. What are the factors related to the assessment of students' learning that hinder ICT integration into the learning process through the Tatweer Educational Portal in your school?

9. Would you like to add any other factor that may hinder ICT integration into the learning process through the Tatweer Educational Portal in your school?

10. Would you like to add any factor that may stimulate ICT integration into the learning process through the Tatweer Educational Portal in your school?

vi. *Your suggestions in order to achieve successful ICT integration into the teaching and learning process through the Tatweer Educational Portal in terms of the following elements:*

1. Devices for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

2. Programs for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

3.   Networks for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

4.   Leadership of ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

5.   Policies for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

6.   Training for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

7.   Changes to curricula for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

8.   Changes to the pedagogic practice of teachers for ICT integration into the teaching process through the Tatweer Educational Portal in your school.

9.   Changes to the learning practice of students for ICT integration into the learning process through the Tatweer Educational Portal in your school.

10.   Changes to the assessment of students for ICT integration into the teaching and learning process through the Tatweer Educational Portal in your school.

11.   Would you like to add any further suggestions?

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Thanks for your cooperation.

Appendix 3: Students' questionnaire

The purpose of the questionnaire

This study aims at establishing a conceptual model to implement the Tatweer Portal. The title of this study is: Integration of Information and Communications Technology into the Teaching and Learning Process (Case Study of Schools Implementing the Tatweer Educational Portal). The main objective of this questionnaire is to conduct a deep investigation into the integration of information and communications technology (ICT) into the teaching and learning process through the Tatweer Educational Portal in general. Therefore, I hope that your answers are not limited to the status quo in your school, but rather based on a comprehensive review of the Tatweer Educational Portal Project through your experience and knowledge in particular. Thus, your views will greatly contribute to establishing this model of the implementation of the Tatweer Portal in order to be used to improve the track of the Tatweer Educational Portal Project.

The researcher

First: Personal data

Please answer these questions by ticking (✓) the answers appropriate to you or by filling in the spaces.

1. **Gender**

   Male ☐   Female ☐

2. **Have you ever taken educational courses concerning using ICT in learning?**

   Yes, I have taken a course ☐ No, I have not ☐

   If you answered Yes, how many courses did you take?

   More than 4 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐

   Please mention it:

   - ❖ …………………………………………..
   - ❖ …………………………………………..
   - ❖ …………………………………………...

3. **Do you own a PC or tablet device (such as an iPad)?**

   Yes ☐   No ☐

4. **Do you have Internet access at home?**

   Yes ☐   No ☐

5. **Do you use the Internet?**

   Yes ☐   No ☐

   If you answered Yes, how often do you use it?

   Rarely ☐   Sometimes ☐   Often ☐   Always ☐

6. **Which of the following technologies do you use in learning (you can choose more than one answer)?**

   PC ☐ iPad ☐ **Interactive whiteboard** ☐

   Software ☐ Chat sites ☐ Electronic encyclopedias (such as Wikipedia) ☐

   Specialized educational sites ☐ Social networks (like Facebook or Twitter) ☐

   Other ☐

   Please mention it:

   - ❖ …………………………………………..
   - ❖ …………………………………………..
   - ❖ …………………………………………...

7. **Have you ever used the Tatweer Educational Portal?**

   Yes ☐   No ☐

If you answered Yes, how often do you use it?

Rarely ☐   Sometimes ☐   Often ☐   Always ☐

Second: Study objectives

I. *Female/male students' benefits of using the Tatweer Educational Portal in the process of learning*

Choose the answer that expresses your opinion regarding students' acceptance and benefits of using the Tatweer Educational Portal in the learning process through ticking one of the five answers next to each of the following statements. (Note that you can add statements considered to be appropriate within this objective.)

No.	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	The Portal Project satisfies my desire in using technology in learning.					
2.	The Portal Project plays a main role in facilitating the process of learning.					
3.	The Portal supports my curricula as it provides good educational resources.					
4.	The Portal contributes to my participation in preparing for lessons.					
5.	The Portal helps in developing my process of learning through posting materials					

	including explanations of the lessons and exercises by female/male teachers.					
6.	The Portal helps me in following up my subjects.					
7.	The Portal facilitates me in doing my homework.					
8.	The Portal helps me in self-learning and reduces my dependency on female/male teachers.					
9.	The Portal contributes to developing my learning skills.					
10.	The Portal enhances the students' critical thinking.					
11.	The Portal helps me in being a partner to my female/male teacher in leading the process of learning.					
12.	The Portal increases my learning incentive.					
13.	The Portal enhances problem-solving skills of female/male students through joint educational projects.					
14.	The Portal achieves a cooperative					

	environment for female/male students.					
15.	The Portal contributes to improving the school achievement of female/male students.					
16.	The Portal helps female/male students to communicate with their female/male teachers and colleagues outside the school.					

You can add other statements to this objective:

1……………………………………………..

2.………………………………………….

3…………………………………………..

II. *Incentives and hindrances to using the Tatweer Educational Portal in the process of learning*

Choose the answer that expresses your opinion regarding the incentives and hindrances to using the Tatweer Educational Portal in the process of learning through ticking one of the five answers next to each of the following statements. (Note that you can add statements considered to be appropriate within this objective.)

No.	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	Lack of participation of female/male students in drawing up the policies of the					

	Portal Project is considered a hindrance to using the Portal.					
2.	Female/male teachers' encouragement and motivational support for students towards use the Portal are considered an incentive to use the Portal.					
3.	Providing the schools implementing the Portal Project with a separate budget is considered an incentive to use the Portal.					
4.	Lack of technical support hinders using the Portal.					
5.	Lack of providing high-speed Internet inside the schools implementing the Portal Project hinders its use.					
6.	Providing schools with PCs for female/male students as well as computer software is considered to be an incentive to implement the Tatweer Educational Portal.					

7.	Lack of equipping classes with technical means necessary for using the Portal such as interactive whiteboards hinders implementing the Tatweer Educational Portal Project.					
8.	The current curricula are not a hindrance to implementing the Tatweer Educational Portal Project.					
9.	Lack of preparing female/male students and training them for a sufficient period of time before implementing the project hinders using the Portal.					
10.	Disinclination of some female/male students to use ICT in the learning process hinders implementing the Tatweer Educational Portal Project.					
11.	Strong interaction and enthusiasm among female/male students' parents motivate students to use the					

	Tatweer Educational Portal.					
12.	Lack of experience and training of female/male teachers hinders use of the Portal by female/male students.					
13.	Not changing teaching methods to suit the Tatweer Educational Portal hinders implementing the Portal Project for female/male students.					
14.	Absence of PCs or Internet access at some students' homes hinders implementing the Tatweer Educational Portal Project.					
15.	Lack of motivation and encouragement of female/male students by the Saudi Ministry of Education to use the Portal hinders the implementation of the Portal Project.					

You can add other statements to this objective:

1………………………………………..

2.……………………………………….

3……………………………………………..

III. *Suggestions to make the implementation of the Tatweer Educational Portal in the process of learning successful*

Choose the answer that expresses your opinion regarding suggestions for making the implementation of the Tatweer Educational Portal in the process of learning successful through ticking one of the five answers next to each of the following statements. (Note that you can add statements considered to be appropriate within this objective.)

No.	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	Facilitating classrooms with electronic necessities including interactive whiteboards.					
2.	Providing every female/male student with PCs (laptops) or tablets (such as iPads).					
3.	Providing assisting computer software for teaching curricula that suits the Portal.					
4.	Integrating Semanoor program (this program suits the Saudi curricula and contains interactive pages) into the Tatweer Educational Portal.					
5.	Regularly providing high-quality, high-speed					

	broadband Internet connection covering schools implementing the Tatweer Educational Portal.					
6.	Providing financial and motivational support for female/male students to encourage them to integrate information and communications technology in the process of learning through the Tatweer Educational Portal.					
7.	Making female/male students' assessment through the Portal part of the learning process					
8.	Appointing a full-time dedicated and technically qualified manager for the Portal inside the school.					
9.	Involving female/male students in the policy-making procedure of the Tatweer Educational Portal Project.					
10.	Distributing booklets of the visions, policies and goals of the Portal among students.					
11.	Improving female/male students' training in the Tatweer Educational Portal and providing					

	means of trainee assessment to ensure his/her mastering of the skills at the end of the training course.					
12.	Improving the curricula of schools implementing the project through focusing on electronic activities.					
13.	Mandatory for female/male teachers to use the Tatweer Educational Portal in the process of learning.					
14.	Allowing female/male students to use their own tablets, laptops or smart phones inside the school as long as they are used for learning purposes.					
15.	Developing the Portal website in order to make it easier and clearer.					
16.	Activating all the systems (services) of the Tatweer Educational Portal, especially virtual classes.					
17.	Expanding the implementation of the Portal Project to all Saudi schools after overcoming the problems of implementation in the experimental phase.					

You can add other statements to this objective:

1…………………………………………..

2.…………………………………………

3…………………………………………..

Appendix 4: Questionnaire for the teachers

The purpose of the questionnaire

This study aims at establishing a conceptual model to implement the Tatweer Portal. The title of this study is: Integration of Information and Communications Technology into the Teaching and Learning Process (Case Study of Schools Implementing the Tatweer Educational Portal). The main objective of this questionnaire is to conduct a deep investigation into the integration of information and communications technology into the teaching and learning process through the Tatweer Educational Portal in general. Therefore, I hope that your answers are not limited to the status quo in your school, but rather based on a comprehensive review of the Tatweer Educational Portal Project through your experience and knowledge in particular. Thus, your views will greatly contribute to establishing this model for the implementation of the Tatweer Portal in order to be used to improve the track of the Tatweer Educational Portal Project.

The researcher

First: Personal data

Please answer these questions by ticking (✓) the answers appropriate to you, or filling in the spaces.

7. **Specialization**

   (   )

8. **Age**

   Below 25 ☐   25-40 ☐   Above 40 ☐

3. **Gender**

   Male ☐   Female ☐

4. **Qualifications:**

   Female/Male Teachers' Institute☐   Diploma☐   University☐

   Post graduate☐

5. **Years of experience:**

   Less than 10 ☐   10-20 ☐   More than 20 ☐

6. **Have you ever taken educational courses in using ICT in education?**

   Yes, I have taken a course ☐   No, I have not ☐

   If you answered Yes,

   how many courses did you take?

   More than 4 ☐   4 ☐   3 ☐   2 ☐   1 ☐

   Please mention them:

   ❖   …………………………………………..

   ❖   …………………………………………..

   ❖   …………………………………………...

   ❖   …………………………………………...

   ❖   …………………………………………...

7. **Do you own a PC or tablet device (such as an iPad)?**

   Yes ☐   No ☐

8. **Do you have Internet access at home?**

Yes ☐   No ☐

9. **<u>Do you use the Internet</u>?**

Yes ☐   No ☐

<u>If you answered Yes, how often do you use it?</u>

Rarely ☐   Sometimes ☐   Often ☐   Always ☐

10. **<u>Which of the following technologies do you use in learning (you can choose</u>**
    <u>more than one answer</u>)?

PC ☐   iPad ☐   Interactive whiteboard ☐

Computer software ☐   Chat sites ☐

Electronic encyclopedias (such as Wikipedia) ☐

Specialized educational sites☐

Social networks (such as Facebook or Twitter)   Other☐

Please mention it:

❖ …………………………………………..

❖ …………………………………………..

❖ …………………………………………..

❖ …………………………………………..

❖ …………………………………………..

11. **<u>Have you ever used the Tatweer Educational Portal?</u>**

Yes ☐   No ☐

If you answered Yes, how often do you use it?

Rarely ☐   Sometimes ☐   Often ☐   Always ☐

Second: Study objectives

I. *Benefits of implementing the Tatweer Educational Portal in the teaching and learning process*

Tick the answers that express your opinion regarding the benefits of implementing the Tatweer Educational Portal in the integration of information and communications technology into the teaching and learning process through ticking one of the five answers next to each of the following statements. (Note that you can add statements considered to be appropriate within this objective.)

No.	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	The Portal Project is great, and will make changes and reformations required in the process of teaching and learning if it is implemented in the right way.					
2.	The Portal supports the increase of efficiency of teaching through e-learning.					
3.	The Project plays a main role in facilitating the process of learning.					
4.	The Portal enhances using websites, videos, and PowerPoint files in explaining some school subjects.					
5.	The Portal facilitates female/male teachers in preparing for lessons.					

6.	The Portal is beneficial for female/male teachers in issuing homework and announcements for students out of school time.					
7.	The Portal is beneficial in preparing experimental tests out of school time.					
8.	The Portal helps to improve the process of learning through female/male teachers posting materials including exercises and their answers on the Portal for the use of female/male students out of school time.					
9.	The Portal helps to improve the process of teaching through posting many educational presentations and multimedia files as a perk in relation to the curricula.					
10.	The Portal helps female/male teachers in following up their implementation of school curricula.					
11.	The Portal helps female/male teachers in facilitating new teaching strategies.					
12.	The Portal is beneficial in implementing a strategy of e-learning.					

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13.	The Portal helps female/male teachers to communicate with female/male students out of school.	242				
14.	The systems of the Portal help integrate ICT in the process of learning and teaching.					
15.	The Portal contributes to developing and improving female/male students' learning skills.					
16.	The Portal helps many female/male students achieve self-learning.					
17.	The Portal supports collaborative learning among female/male students.					
18.	The Portal reinforces the female/male students' skills in problem solving through joint educational projects.					
19.	The Portal enhances female/male students' skills in critical thinking.					
20.	The Portal Project helps in improving female/male students' school achievement.					

You can add other statements to this objective:

1…………………………………..

2…………………………………………….

3………………………………………..

II. _Incentives and hindrances to using the Tatweer Educational Portal in the process of teaching and learning_

Tick the answers that express your opinion regarding the incentives and hindrances to using the Tatweer Educational Portal in the process of teaching and learning through ticking one of the five answers next to each of the following statements. (Note that you can add statements considered to be appropriate within this objective).

No.	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	Female/male teachers not participating in the policy-making procedure of the Portal is considered a hindrance to integrating this technology in the process of learning and teaching through the Portal.					
2.	Correspondence between the policies for the Tatweer Educational Portal, national strategies to integrate ICT in education, and the new initiatives to reform education in the KSA motivate female/male teachers to integrate information and communications					

	technology through the Tatweer Educational Portal.				
3.	The availability of dedicated leadership to manage the Portal pedagogically is a motivating factor for integrating information and communications technology through the Tatweer Educational Portal.				
4.	Dedicating an independent budget to schools to support the implementation of the Portal is an incentive to implementing the Portal.				
5.	Cancelling paperwork in teachers' preparation for lessons is a motivating step towards implementing the Portal.				
6.	The limit of technical support for the Portal in schools hinders implementing the Portal.				
7.	The unavailability of high-speed Internet connections in schools hinders implementing the Tatweer Educational Portal Project.				
8.	The lack of technical equipping of classes for				

	using the Portal hinders implementing the Tatweer Educational Portal Project.					
9.	The current Saudi curriculum does not hinder implementing the Tatweer Educational Portal Project, as teachers may adapt their curricula to the Portal.					
10.	The disinclination of female/male students to use ICT hinders implementing the Portal.					
11.	Strong parents' interaction and enthusiasm motivates implementing the Tatweer Educational Portal Project.					
12.	Most female/male teachers follow the traditional way of teaching methods, which hinders implementing the Tatweer Educational Portal Project.					
13.	Some female/male teachers lack sufficient experience and training in using the Portal, which hinders implementing the Tatweer Educational Portal Project.					

14.	The absence of specialized courses for female/male teachers in designing lessons through the Portal hinders implementing the Tatweer Educational Portal Project.					
15.	The unavailability of programs to aid teaching some school subjects on the Portal hinders implementing the Tatweer Educational Portal Project.					
16.	The absence of training programmes for teachers on assessing students' performance through the Portal hinders implementing the Tatweer Educational Portal Project.					
17.	The unavailability of computers and Internet access in some students' homes hinders implementing the Tatweer Educational Portal Project.					
18.	Lack of motivation and encouragement offered by the Ministry of Education to teachers and students on using the Portal hinders					

	implementing the Tatweer Educational Portal Project					

You can add other statements to this objective:

1…………………………………………..

2………………………………………….

3…………………………………………..

III. Suggestions for the success of implementing the Tatweer Educational Portal Project

Tick the answers that express your opinion regarding suggestions for the success of implementing the Tatweer Educational Portal Project in integrating information and communications technologies in the process of teaching and learning through ticking one of the five answers next to each of the following statements. (Note that you can add statements considered to be appropriate within this objective.)

No.	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	Providing female/male teachers with laptop PCs or tablet devices (such as iPads).					
2.	Providing all facilities in the school relating to students and teachers with computers, such as labs and classes, and offering the necessary maintenance.					
3.	Providing computer software for teaching curricula that suits the Portal working system.					
4.	Integrating Semanoor Program into the Portal (this program complies with the Saudi curricula, and					

	includes interactive pages).					
5.	Providing schools implementing the Portal with a high-speed, regular, high-quality broadband Internet connection and a wireless network.					
6.	Offering teachers and students financial and motivational support to encourage them to use the Tatweer Educational Portal.					
7.	Combining usage of the Portal in the performance appraisal of female/male teachers.					
8.	Training school leaders in managing the technical aspects of using the Portal in order to be experts in this field.					
9.	Appointing a full-time manager technically qualified to manage the Portal in each school.					
10.	Facilitating and clearly communicating policies for					

	integrating information and communications technologies into the process of teaching and learning through the Tatweer Educational Portal.				
11.	Distributing booklets of the policies, visions and goals of the Portal among students, teachers, and school leaderships.				
12.	Enhancing the level of training in the Tatweer Educational Portal Project, along with finding a means to evaluate the trainee to make sure that he/she has acquired the targeted skill by the end of the programme.				
13.	Providing teachers with subject-specific training courses through the Portal. .				
14.	Improving curricula of schools implementing the Portal in accordance with the use of ICT in general and of the				

	Portal in particular, to increase focus on the electronic activities through the Portal.					
15.	Mandatory for the teachers to use the Tatweer Educational Portal in the teaching and learning process.					
16.	Making the Portal a part of students' performance assessment.					
17.	Developing the website of the Portal for a user-friendly interface .					
18.	Making use of international programmes related to ICT to improve the qualification and training of the Portal users.					
19.	Fully activating all systems of the Portal.					
20.	Expanding the implementation of the Portal to all schools in the KSA after overcoming problems of implementation in the experimental phase.					

You can add other statements to this objective:

1…………………………………………..

2………………………………………….

3…………………………………………..

Appendix 5: The main SPSS output of the EFA test

Total Variance Explained			
Component	Rotation sums of squared loadings		
	Total	% of variance	Cumulative %
1	4.234	23.524	23.524
2	3.595	19.974	43.498
3	2.515	13.974	57.472
4	2.247	12.481	69.953
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

Appendix 6: Regression for Issue 1 (the output of SPSS)

Model Summary									
Model	R	R-Squared	Adjusted R-Squared	Std. error of the estimate	Change statistics				
					R-Squared change	F Change	df1	df2	Sig. F Change
1	0.835[a]	0.698	0.693	0.55406926	0.698	149.989	1	65	0.000
2	0.889[b]	0.790	0.783	0.46587680	0.092	27.939	1	64	0.000
3	0.908[c]	0.825	0.816	0.42837076	0.035	12.698	1	63	0.001
a. Predictors: (Constant), Factor 7									
b. Predictors: (Constant), Factor 7, Factor 8									
c. Predictors: (Constant), Factor 7, Factor 8, Factor 4									

Coefficients[a]						
Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. error	Beta		
1	(Constant)	-6.511	0.536		-12.149	0.000
	Factor 7	1.403	0.115	0.835	12.247	0.000
2	(Constant)	-7.052	0.462		-15.261	0.000
	Factor 7	0.926	0.132	0.551	7.014	0.000
	Factor 8	0.597	0.113	0.415	5.286	0.000
3	(Constant)	-7.203	0.427		-16.868	0.000
	Factor 7	0.677	0.140	0.403	4.835	0.000
	Factor 8	0.504	0.107	0.350	4.702	0.000
	Factor 4	0.379	0.106	0.273	3.563	0.001

a. Dependent variable: REGR factor score 1 for analysis 5

Excluded variables[a]						
Model		**Beta in**	**t**	**Sig.**	**Partial correlation**	**Collinearity statistics**
						Tolerance
1	Factor 4	0.361[b]	4.216	0.000	0.466	0.503
	Factor 5	0.227[b]	2.631	0.011	0.312	0.571
	Factor 6	0.343[b]	3.199	0.002	0.371	0.355
	Factor 8	0.415[b]	5.286	0.000	0.551	0.532
2	Factor 4	0.273[c]	3.563	0.001	0.410	0.473
	Factor 5	0.193[c]	2.645	0.010	0.316	0.566
	Factor 6	0.290[c]	3.202	0.002	0.374	0.350
3	Factor 5	0.107[d]	1.399	0.167	0.175	0.467
	Factor 6	0.166[d]	1.580	0.119	0.197	0.246

a. Dependent variable: REGR factor score 1 for analysis 5

b. Predictors in the model: (Constant), Factor 7

c. Predictors in the model: (Constant), Factor 7, Factor 8

d. Predictors in the model: (Constant), Factor 7, Factor 8, Factor 4

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