Good Practice Framework for Virtual Learning Environment in Higher Education

A Thesis Submitted for the Degree of Doctor of Philosophy

By

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July 2015

ABSTRACT

Many higher education institutions (HEIs) around the world are investing in the implementation of different Virtual Learning Environments (VLEs) to support the teaching and learning process. However, there is a lack of detailed guidelines or a practical framework for the VLE system implementation without which an effective VLE system implementation framework, many of the full potential of VLE system cannot be realised objectives and benefits remain underachieved. A small number of frameworks specific for VLE system implementation are reported in the literature; however, these are not comprehensive in terms of covering the entire end-to-end implementation, do not consider all the key elements of a VLE system implementation and are far from integrated. Moreover, a practice-based framework that considers various organisational, pedagogical, and technological aspects and covers the entire end-to-end implementation, is not available in the current literature, and there is no complete set of guidelines to be used by HEIs to support and manage an effective VLE system implementation. Therefore, further research is needed for investigating various key elements and for identifying aspects of a good-practice framework for the implementation of VLE systems in HEIs. Particularly, an integrated good-practice framework that is comprehensive and integrates elements from existing literature and current practices or case studies would be a significant and useful contribution to this field, which highlights the importance of this study. Hence, research into investigating a good-practice VLE system implementation framework is important, and this thesis builds and presents a good-practice-in-context framework for the implementation and use of VLE systems in HEIs. This is done through identifying and exploring the key elements that build-up such a comprehensive practice-based framework for VLE system implementation through literature and good practices by considering various pedagogical, technical, and organisational aspects. These key elements include stages, processes, critical success factors (CSFs) considered, challenges (CLG) faced, associated risks, stakeholders (SHs) involved, and various tools, technologies, and methods, integrated with the VLE system. The key elements provide a deeper understanding of the fundamental issues and success factors underlying the successful implementation and sustainability of a VLE system. Initially, a conceptual framework was developed encapsulating various key elements of a VLE system implementation framework based on an extensive literature review and an analysis of existing frameworks and models, encapsulating various key elements of a VLE system implementation framework, where the elements were integrated and mapped with each other highlighting and depicting interrelations and interactions among them. The conceptual framework was validated by empirical data from the two case studies (of HEIs, at local and national level) to propose a refined, novel, and practice-based framework for VLE system implementation in HEIs, which also contains mappings to Technology Enhance Learning (TEL) strategy components. Thus, the proposed good-practice-in-context framework can be used as a tool to assist or guide HEIs to implement VLE system successfully. Finally, the proposed framework could lead to a successful VLE system implementation and it could also serve as an effective approach that not only facilitates enhancement in the learning and teaching experience, but also fosters end-user engagement and supports flexibility and customization according to the end-user needs of HEIs.

ACKNOWLEDGEMENTS

I firstly would like to offer my thanks to Allah Almighty for His guidance and blessings during my PhD.

Many thanks go to my supervisor Professor Lampros K. Stergioulas, who has been of significant importance throughout my research by providing me supportive guidance, and valuable advice. I would also like to extend my thanks to my second supervisor Dr. David Bell.

My deepest and heartfelt thanks go to my wonderful husband Fahad for his love and cooperation and to my beloved kids: Sara, Sultan, Aliah, and Felwah; without their patience and support I would not have been able to achieve this.

I would also like to extend sincere thanks to my father Dr. Hammad for encouraging and promoting me to pursue higher qualifications and acquire more knowledge; my thanks also pass to my lovely mother Hussa for her prayers and support.

Finally, I would also like to pass my special thanks to all my friends in London for being next to me in the hard times we shared during the PhD journey.

Latefa Bin Fryan

DECLARATION

The following papers have been published (or submitted for publication) as a direct result of the research discussed in this thesis:

1. L. Bin Fryan and L.K. Stergioulas,' A Best Practice in Context for VLE System Implementation: Lessons Learnt from Case Studies in HEIs' The ICBTS Institute on International Social Sciences and Education Research Conference, Harvard University, Boston, MA. 9-13 June 2015. ***(Paper Accepted)***

2. L. Bin Fryan and L.K. Stergioulas,' Conceptual Framework for VLE Implementation in HEIs', British Journal of Educational Technology (BJET), April 2015. ***(Paper Submitted)***

3. L. Bin Fryan and L.K. Stergioulas,' Validated and Refined Framework for VLE Implementation in HEIs', British Journal of Educational Technology (BJET), April 2015. ***(Paper Submitted)***

4. L. Bin Fryan and L.K. Stergioulas, An Investigation into Best Practices for e-learning Implementation in Higher Education, in the Doctoral Consortium at the European Conference on Technology Enhanced Learning 2013 co-located with the EC-TEL 2013 conference (EC-TEL 2013), Paphos, Cyprus, 17-18 September, 2013.

5. L.K. Stergioulas and L. Bin Fryan, Investigation into Best Practices for e-learning Implementation: Bridging the Gap between Current and Future State, in elearning 2.0 Conference 2013, Brunel University, UK, 31st July 2013.

6. L.K. Stergioulas, C. Loureiro-Koechlin, and L. Bin Fryan, A brief overview of the state of TEL research around the world, in the Proceedings of IFIP Working Conference "Addressing education challenges: the role of ICT", Manchester Metropolitan University, Manchester UK, 2-5 July 2012

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ABBREVIATIONS

CLGs	Challenges
CSFs	Critical Success Factors
HEIs	Higher Education Institutions
IHEP	Institute for Higher Education Policy
IS	Information System
JISC	Joint Information Systems Committee
SHs	Stakeholders
VLE	Virtual Learning Environment

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Chapter 1: Introduction

1.1 Overview

Virtual Learning Environment (VLE) is an integrated system containing a number of facilities that allow practitioners and learners to interact with one another within an online environment (DFES, 2004). Britain and Liber (1999) describe the VLE as a Learning Management System (LMS) that blends the functionality of computer-mediated communications software (such as e-mail, bulletin boards, or newsgroups) and online methods of delivering course materials. VLEs gained popularity in Higher Education Institutions (HEIs) in the last decade (Quinsee and Bullimore, 2011). The majority of HEIs consider VLE systems as the norm for e-learning provision (Derntl and Motschnig-Pitrik, 2004; Gramp, 2013; Sarker et al., 2013; Quinsee and Bullimore, 2011). The benefits of e-learning systems, such as VLE across HEIs, cannot be denied due to their positive effect on teaching and learning experiences (Beastall and Walker, 2007). Moreover, one of the main reasons for implementing VLE system in HEIs is to increase the quality of e-learning and to enhance the learning experience (Beckton, 2009; Derntl and Motschnig-Pitrik, 2004; Marshall and Mitchell, 2002; Sarker et al., 2013), which requires embedded strategies for stimulating the effective use of VLE systems (Derntl and Motschnig-Pitrik, 2004; Gramp, 2013). HEIs require a cost effective and sustainable VLE system, which can enhance the learning and teaching experiences of end-users (Sarker et al., 2013). In HEIs, VLE systems are still used at quite rudimentary levels, such as for the delivery of electronic documents to students (Beckton, 2009; Gramp, 2013; Sharpe et al., 2006). Moreover, many VLE systems cannot adapt to the dynamic learners' needs or the technological advancements, and careful consideration of evaluation by HEIs is required (Quinsee and Bullimore, 2011). Therefore, VLE system implementation in HEIs needs to capsulate technical considerations (Bell and Bell, 2005; Sarker et al., 2013) and consider pedagogical aspects (Beastall and Walker, 2007; Bell and

Bell, 2005; Gramp, 2013; Quinsee and Bullimore, 2011) as well as organizational factors (Beastall and Walker, 2007; Bell and Bell, 2005; Gramp, 2013; Marshall and Mitchell, 2002). The literature reports that VLE systems positively change students' learning experiences if successfully implemented (Beastall and Walker, 2007; Beckton, 2009; Gramp, 2013). One of the most valuable lessons learned from the successful rollout of VLE systems in HEIs is to focus on users' needs (from the system), giving the end-user an opportunity to express their needs instead of concentrating on what the system could do for them (Beastall and Walker, 2007; Beckton, 2009). Moreover, previous studies have acknowledged that an overall framework is lacking (Marshall and Mitchell, 2002) to guide the implementation of e-learning systems such as VLE in HEIs to ensure improvements in teaching and learning outcomes. Several studies have been reported for the implementation of e-learning technologies in HEIs listing several models and frameworks that are composed of one or more key elements such as multiple stages, processes, critical success factors (CSFs), challenges faced, stakeholders involved, tools, technologies, and methods; however, the existing frameworks which are specific to VLE system implementation in HEIs are limited and not comprehensive enough to consider all the key elements. Hence, this research focuses on shedding light on this problem.

1.2 Research Gap

HEIs spend huge amounts of money, effort and time in implementing VLE systems; however, a fully successful VLE system implementation whereby the end-users are engaged and getting the most use of it by achieving benefits at the institutional, staff, and student level cannot yet be achieved. Some institutions, such as the UK Department for Education (DFES, 2004), set a common inspection framework with seven questions related to e-learning management, e-learning teaching, learning and training and e-learning supporting learning; however, detailed guidelines or practical framework for the VLE system implementation are still missing. The frameworks reported in the literature are not comprehensive in terms of covering the entire implementation from end to end, and do not consider all the key elements of a VLE system implementation - for example, they are focussing on one or limited stages of the entire VLE system implementation (MacLean and Scott, 2011), or consider only a few CSFs (Collis and Moonen, 2001) that are not really integrated. Moreover, existing literature on VLE systems is currently lacking a user-friendly and, most importantly, practice-based framework that considers various organisational, pedagogical and technological aspects. Therefore, further research is needed to investigate various key elements and to identify aspects of a good-practice (Mostefaoui et al., 2012) framework for the implementation of VLE systems in HEIs. Particularly, an integrated good-practice framework that is comprehensive and integrates elements from existing literature (secondary data) and current practices (primary data) would be a valuable and useful contribution to this field, thus highlighting the importance of this study.

Hence, there is a need to investigate and develop such a good-practice framework, and for this purpose, conduct an in-depth investigation to identify the key elements that can contribute to a successful, comprehensive, and practice-based framework that can serve as a guideline for the implementation of VLE system in HEIs. Therefore, this study is going to address the following research question: '*How to build a good-practice-in-context framework for the implementation and use of VLE systems in Higher Education Institutions (HEIs)*?*'*Other follow-up questions *are 'What are the most important CSFs of the VLE system implementation?', 'Which challenges are faced in each stage of the VLE system implementation?', and 'Who are the stakeholders involved in each stage of the VLE system implementation?*

1.3 Research Aim and Objectives

Considering the research gap mentioned in the previous section, in order to address the aforementioned research questions, the aim of this research is to:

'*Build a good-practice-in-context framework for the implementation and use of VLE systems in Higher Education Institutions (HEIs*).

For this purpose, it is imperative to investigate existing literature and primary data to identify the key elements that could build up such a framework. The key elements need to be integrated and mapped with each other, highlighting their interrelationships, based on findings from the secondary data and validated using primary data in order to propose a good-practice framework. The proposed framework can be considered as a guideline for HEIs in order to implement a VLE system successfully. The research objectives of this thesis are as follows:

Objective 1: Review the available e-learning approaches and practices in order to gain an understanding of the state-of-the-art of e-learning practice in academia.

Objective 2: Identify good practices in VLE system implementation through conducting extensive literature review about existing frameworks.

Objective 3: Identify the key elements of VLE system implementation, then conduct mapping among them to develop a conceptual framework.

Objective 4: Identify good practices in VLE system implementation in HEIs through investigations in primary data collection to validate and refine the conceptual framework.

Objective 5: Propose the revised comprehensive framework for good practices that could enable successful implementation of VLE system in HEIs.

1.4 Research Approach

In Information Systems (IS), the two most commonly used types of research methods are quantitative and qualitative research. There is a growing trend of using qualitative research approaches to study the IS phenomena (Dube and Pare, 2003). Considering the aim of this research, the qualitative research approach was adopted because it enables the generation of theory from practice (Miles and Huberman, 1994; Myers, 1997) and enables gaining in-depth understanding of phenomena (Benbasat and Zmud, 1999; Marshall and Rossman, 1999; Silverman, 2010). This research conducts an in-depth investigation on the key elements of the VLE system implementation in HEIs by examining various good practices. Thus, the adoption of qualitative research for this research seems a suitable approach to gain better understanding of the phenomena under investigation.

Moreover, the case study research has gained wide acceptance over the past decade in the IS field (Dube and Pare, 2003; Klein and Myers, 1999; Orlikowski and Baroudi, 1991). Since case study enables examination of the various factors and their inter-relationships, it is mainly suitable for research into the development, implementation and the on-going use of IS (Oates, 2006), combining several qualitative data collection methods such as interviews, observation and documentation; it could also include quantitative data (Dube and Pare, 2003). Considering the research question and the nature of investigation required for this thesis, the case study research strategy has been chosen as the most suitable using various data collection methods, such as interviews, surveys, observations, and documentary analysis, as explained in detail in Chapter 4. Yin (2003) suggested that there are three types of case study investigations: descriptive, exploratory and explanatory. The case study followed in this research can be classified as exploratory case research because this study addresses a particular new set of questions in public sector studies, pertaining to education. Moreover, it attempts to answer questions with 'what' and 'how' forms. It is vital for a case study design to consider analysing one or multiple cases. Miles and Huberman (1994) suggest that multiple case studies can enhance generalizability and deepen understanding and explanation. For the purpose of this research, two case studies are conducted at different levels: National Level (considering various UK universities) and Local Level (considering a local-level HEI in the UK). The research process adopted in this thesis is based on Jankowicz's (2005) three high-level phases: 1) research design; 2) data collection; and 3) data analysis:

1. For the first phase, the topic for investigation was decided and the research design was selected, which included the research paradigm, research approach and the research strategy. Moreover, the research question, aim and objectives were established.

2. The second phase involved data collection, including secondary data collection through extensive literature search and the primary data collection through conducting two Case Studies.
3. The third phase is the data analysis, which includes analysis of the secondary data to come up with a conceptual framework out of the literature review analysis and the qualitative data analysis of the primary data using the Nvivo software. Moreover, it involves validation of the conceptual framework against the findings from the case studies and proposing the revised framework and recommendations.

This thesis has been structured according to the Phillips and Pugh (2000) methodology, which consists of four components, as explained below and displayed in Figure 1-1.

1.4.1.1 Background theory

This involves a comprehensive literature review of the existing e-learning approaches and good practices in order to gain an understanding of the state-of-the-art about e-learning system implementation in HEIs, as presented in Chapter 2.

1.4.1.2 Focal theory

The focal theory establishes the nature of research problem and sets the basis for analysing it by generating the conceptual framework for the good practices of VLE system implementation from the literature review analysis. The conceptual framework covers the technical, institutional, and pedagogical aspects of the VLE system implementation, as presented in Chapter 3.

1.4.1.3 Data theory

The data theory refers to identifying the research methodology adopted for this research and the data analysis methods used, indicating a clear justification for the relevance and validity of the material used to support the thesis, as presented in Chapter 4 and Chapter 5.

1.4.1.4 Novel contribution

The new contribution of this research to the body of knowledge is a comprehensive refined framework for the good practice of VLE system implementation in HEIs, as presented in Chapter 6.

Figure 1-1 illustrates and summarizes the thesis outline in order to provide an abstract level structure that maps the research process to the thesis chapters.

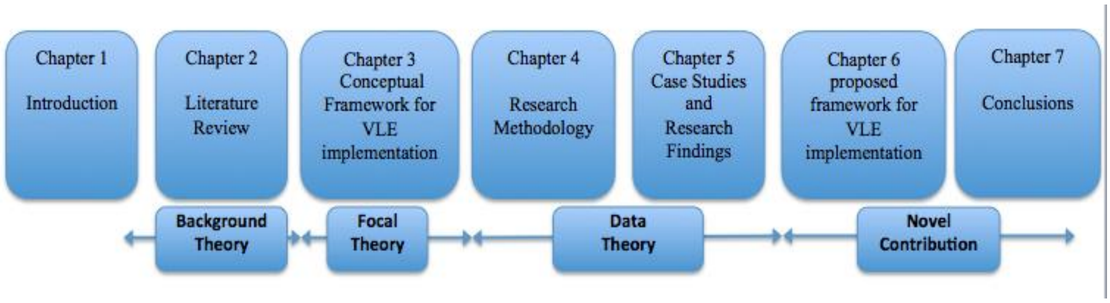

Figure 1-1 Thesis Outline

1.5 Thesis Structure

In line with the objectives of the research, this thesis is structured as follows:

Chapter 1. This chapter presents an overview of the research. The research aim, question and objectives are presented. A brief description of the research approach and structure of the thesis are also explained.

Chapter 2. This chapter reports a critical review of literature related to available e-learning practices, including background to the research theories, related e-learning system implementation frameworks and models. This chapter presents findings from the secondary data collection and identifies the key elements of VLE system implementation framework and highlights the gaps found in the literature, justifying the need for and importance of this research.

Chapter 3. Based on the findings from the literature review in Chapter 2, this chapter presents a conceptual framework for the VLE system implementation in

HEIs, considering the good practices and key elements of VLE system implementation framework; it also identifies related key issues. The conceptual framework encapsulates the various key elements and demonstrates interrelations and interactions among them. This chapter also presents mappings of various VLE system implementation stages with corresponding processes, CSFs, stakeholders involved, and the challenges faced in each stage. These mappings are one of the key contributions of this research.

Chapter 4. This chapter explains the research methodology adopted, including the research philosophy, research strategy, research design, and data analysis methods. Moreover, it discusses the research process and explains the data collection methods adopted for this research. This chapter also presents an overview of the two case studies conducted for the primary data collection, highlighting the validity and reliability of research findings and ethical considerations.

Chapter 5. This chapter presents findings from the two Case Studies conducted at the national and local level in HEIs. Findings from this chapter assist in building the proposed comprehensive framework for the good practice of VLE system implementation, which is also aligned to the TEL strategy presented in this chapter. These findings also facilitate the validation of the conceptual framework presented in Chapter 3. The revised framework is presented in Chapter 6.

Chapter 6. This chapter presents the proposed enhanced and revised framework for VLE system implementation, which is the main contribution of this research. From the data collection (primary and secondary), good practices are identified and utilised in building the proposed framework. In summary, this chapter describes the development and the detailed “mechanics” of the proposed refined and validated framework of the good practice of VLE system implementation in HEIs.

Chapter 7. This chapter concludes the thesis and presents the contributions and key findings of this research. Lastly, relevant conclusions are drawn against the degree to which this research meets its objectives, while an explanation of the research limitations suggesting future improvements is presented.

Chapter 2: Literature Review

2.1 Introduction

This chapter presents findings from the literature review and establishes the basis for a conceptual framework for VLE system implementation, which is presented in Chapter 3 and validated to present the proposed framework in Chapter 6. For the purpose of conducting an extensive literature review, the secondary data was collected from diverse resources such as journals, books, conference papers, newspapers, magazines and websites. The research gaps are identified in order to highlight the importance of this study, introducing the need for developing a comprehensive framework that can work as a guideline for the implementation of a VLE system in HEIs. In order to build a good-practice-in-context framework for the implementation and use of VLE systems in HEIs, it is important to look into the good practices that have already been in place, and to identify and explore key issues relating to good practice. This research explores issues underpinning good practices in the literature and aims to highlight them within the context of successful e-learning and VLE implementation in HEIs. This literature review is more general, considering various good practices and existing frameworks for e-learning systems in HEIs, including the VLE, which is a mainstream e-learning system. This thesis is focussed mainly on the VLE systems that are considered for the two case studies presented in Chapter 5, in order to come up with a proposed good-practice-in-context framework for the implementation and use of VLE systems in HEIs in Chapter 6.

2.2 E-Learning Systems

Electronic learning (e-learning) has no single definition (Nicholson, 2007); it is both multidisciplinary and interdisciplinary, covering a wide range of research topics with scholars from different disciplines conducting e-learning-related research, ranging from content design to associated policy (Hung, 2012). A vast range of meanings is inherent in the term e-learning (Morris and Rippin, 2002); therefore, several definitions of e-learning are reported in the literature. E-learning could be defined as a way of learning that is facilitated and supported through the use of ICT (Al-Jaghoub et al., 2009; NZCER, 2004), with added value to the existing teaching methodology (Broad et al., 2003; Bruck, 2010); this facilitates access to education and training, in addition to improving teaching and learning quality (DFES, 2003; Newton, 2003). Hung (2012) classified e-learning into two categories: the first category, directing to use of network technology by the application of internet or network technologies in order to enhance knowledge, learning and performance (Masie, 2008; Rosenberg, 2001); and the second category, directing to all electronic media by obtaining knowledge through the use of various digital technologies or media, including computers, interactive TV and audio/video (Govindasamy, 2002; Wentling et al., 2000). An e-learning system is also viewed as a web-based educational system that uses IT and computer networks; it widely utilises modern technology, tools, internet, electronic media, or web-based applications to deliver the ultimate learning experience (Engelbrecht, 2003; Hsbollah and Idris, 2009 Selim, 2007).

Moreover, McGill et al. (2014) mentioned that in HEIs, e-learning systems are considered at the institutional level (such as Learning Management Systems - LMS), implemented for the entire institution for enrolling students or for platforms supporting Massive Online Open Courses (MOOCs); and at the local level, supporting only a single class, course, or lesson. Furthermore, McGill et al. (2014) categorises the research published in a broad scope of “e-learning” success resulting in two main categories: the institutional and technological points of view, whereby the former considers e-learning success as being more tied to the institutional policies and strategies, and the latter considers e-learning success as being more focussed on system quality and outcome in terms of learning experience, usability and user satisfaction. E-learning research was classified into four themes by Conole and Oliver (2007). As shown in Table 2-1, this thesis focuses primarily on an intersection between the two themes of e-learning research, pedagogical and technical, as it addresses the development of effective implementation framework for e-learning systems, such as VLEs, and the technical specifications to support different forms of learning, such as through integration of various e-learning tools, technologies and methods into an e-learning implementation framework, as proposed in Chapter 6. However, organisational research aspects are also considered in our study and included in the final proposed framework.

E-learning research themes	*Description*
Pedagogical research	Revolves around the pedagogy of e-learning and development of effective implementation models
Technical research	Discusses the development of technical architectures and specifications to support different forms of learning and teaching
Organisational research	Focuses on organisational-level issues for developing successful learning organisations
Socio-cultural factors research	Cuts across pedagogical, technical and organisational issues, focusing on influence of policy drivers and funding steers, local agendas and initiatives

Table 2-1 E-Learning Research Themes

(Conole and Oliver, 2007, p. 6)

The approach of covering technical and pedagogical perspectives has been used in other studies; for example, in the case study presented by Watson and Hardaker (2005) identifying extensions to LMS for providing individualised tuition through a design process focused on a cognitive learning style approach, thus extending the LMS software developments from the technical and pedagogical perspectives. Another case study by Quinsee and Bullimore (2011, p. 275) on evaluating a VLE reveals that "such evaluation and implementation of educational technologies are not about technical factors but about opportunities and threats presented by such technologies to educational experiences". Therefore, this research focuses on different aspects, which lead to a successful implementation of e-learning technology such as VLE in HEIs.

2.3 Capabilities and Benefits of E-Learning Systems

With computers and the Internet becoming an integral part of higher education (Engelbrecht, 2003), the importance of e-learning cannot be underestimated as it enables connectivity between users and information, and creates opportunities for various social learning approaches (Meredith and Newton, 2004). E-learning emerged from rapid technological change and social or cultural responses to that change; it is a shift from discrete units of training to continuous learning (Sloman, 2001), and has the potential to connect discrete groups of learners to develop new forms of interaction in the learning experience thus providing enhanced flexibility to the learner (Meredith and Newton, 2004). E-learning is one of the most significant recent developments in the information system industry (Wang, 2003) and is considered as an appropriate means of providing education for universities, which lack enough staff, study materials, resources or classes. E-learning is a major transformation of traditional education provision to more modern, effective and efficient alternative educational methods (Freire, 1994; Selim, 2007). It works by taking the best of the traditional classroom learning and modifies it according to the needs and lifestyle of the student, with all the improvements that technology allows (Bruck, 2010; DFES, 2003), thus enhancing learning capabilities. Conole et al. (2006) explored students' experiences of e-learning, illustrating that students are using technologies widely to find, manage and produce contents; also communication tools appear to be significant elements in their learning strategies. Moreover, students prefer to use e-learning because it makes their learning more effective, efficient, and flexible; i.e. they can study anytime, anywhere, and in their own ways (DFES, 2003; Engelbrecht, 2003; MacDonald et al., 2001; Papp, 2000; Welsh et al., 2003). E-learning systems support both individualised and collaborative learning (Bell, 2007; Suddaby and Milne, 2008; Volery and Lord, 2000), and compensate any deficiencies in the traditional learning system (Hsbollah and Idris, 2009) by covering a broad range of teaching activities, such as using technology for enhancing the value of distance learning by increasing interactions among students and the academic staff (Doherty, 2010).

Several benefits of e-learning have been reported in the literature, chief among which are its logistical advantages of being location- and time-independent learning (Bell, 2007; Fayter, 1998; Homan and Macpherson, 2005; Welsh et al., 2003). Findings from a study of the UK Commission for Employment and Skills (Callender and Wilkinson, 2012) confirmed real benefits of part-time HE study for individuals, employers and society facilitated by e-learning. E-learning has been found to benefit all users, including learners, instructors and administrators (DFES, 2003; Govindasamy, 2002). By mapping various strategies for teaching and learning, e-learning creates new or different forms of learning, enabling instructors to reach more learners having diverse backgrounds. It has the potential to act as a driving force to speed up development of society from the technical, industrial and economic perspective (Hung, 2012). E-learning is capable of providing interactive and personalised learning resources, thus supporting and enhancing the achievement of skills and promote individual learning and knowledge management regardless of space and time limitations (Bruck, 2010; DFES, 2003; MacDonald et al., 2001). Moreover, through e-learning, the delivery of educational programs to more students can be realised at a much lower cost (DFES, 2003; Engelbrecht, 2003; MacDonald et al., 2001; Peled, 2000; Volery and Lord, 2000; Welsh et al., 2003).

The quality of e-learning systems needs to be maintained and its importance cannot be underestimated (Engelbrecht, 2003; Inglis, 2008; Shachar and Neumann, 2003). Furthermore, e-learning systems provide communities of common interest, empower learners and support access to information, knowledge management, capacity building and education delivery (Bruck, 2010; DFES, 2003; Engelbrecht, 2003; Welsh et al., 2003). They increase motivation and transform learning from being a passive experience to an interactive context with high user interactivity, metacognitive collaboration and engagement (DFE, 2004; Hoidn, 2006). Moreover, the education system can be more creative, innovative and achieve better value by e-learning (DFES, 2003); e-learning as a result of increasing quality and availability of technology has become quick, effective, flexible, and convenient (MacDonald et al., 2001). Furthermore, e-learning enables immediacy and wide collection of interaction possibilities (similar to face-to-face learning), which make it a practical alternative to traditional teaching at universities (MacDonald et al., 2001). Alexander and McKenzie (1998, p. 244) summarized the benefits for student of the successful implementation of e-learning systems in HEIs as: “improved quality of learning; improved productivity of learning; improved access to learning; and improved student attitudes to learning”. Moreover, effective e-learning requires significant effort and planning for the implementation process. To fully realise the benefits of e-learning, the system should provide significant learning outcomes in terms of knowledgeable workers capable of higher-order thinking and reasoning to solve complicated and realistic problems (Engelbrecht, 2003; Govindasamy, 2002; Weigel, 2002).

Further research is needed to investigate frameworks that enable the integration of various key elements of e-learning and to identify aspects of good practices (Mostefaoui et al., 2012) for the implementation of e-learning systems in HEIs. Moreover, the need and importance of developing a practical framework of identifying, evaluating, highlighting and promoting good practices in e-learning has been acknowledged (Engelbrecht, 2003; Stansfield et al., 2009), as demonstrated by worldwide failures in a significant number of high-profile e-learning projects (Alexander, 2001; Ismail, 2002; Romiszowski, 2004; Ssekakubo et al., 2011; Stansfield et al., 2009) due to lack of financial planning and market research or extraordinarily ambitious plans in relation to the potential student market (Keegan et al. 2007). Hence, there is a need to investigate and develop a framework that serves as a guideline for a successful e-learning system implementation.

2.4 VLE as the Main E-Learning System in HEIs

It was only after 2000 that the e-learning systems were widely implemented in HEIs (Hung, 2012). One major factor driving research growth in this period was the initiation of LMS, which are a type of e-learning systems (Hung, 2012). Considering e-learning as the delivery of instruction through the use of various electronic media, Govindasamy (2002) mentions that all efforts towards the implementation of e-learning eventually tend to the total automation of administrating the teaching and learning processes by means of LMS software, which applies e-learning using the web inside classrooms to enhance the learning process (Al-Busaidi and Al-Shihi, 2010). Britain and Liber (1999) described VLE as a type of LMS that blends the functionality of computer-mediated communications software (including e-mails, bulletin boards and newsgroups) and online methods of delivering course materials. VLE has been defined as an integrated system containing a number of facilities that allows practitioners and learners to interact with one another within an online environment (DFES, 2004).

This thesis focuses on VLE systems that are centrally supported and housed within an HEI, such as a university, providing a unified platform for communications, content delivery, course management and assessment, with managed interfaces linked to university IS and resources (Beastall and Walker, 2007), where the ultimate aim is to foster the learning process inside and outside the classrooms and enhance user experiences. It is the main integrated e-learning system that is implemented by HEIs. In this respect, the concept of a VLE system overlaps broadly with the concepts of e-learning system, LMS, web-based learning environment, and digital learning environment (Al-Busaidi and Al-Shihi, 2010; Mishra, 2002; Romiszowski, 2004). VLE systems also contribute to the flexible learning and blended learning (Beastall and Walker, 2007; Sharpe, 2006; Walker et al., 2014). ICT is used as part of the teaching and learning activities mainly in terms of online searching for information, e-mailing, social networking or as part of VLEs (NSU, 2010). The majority of HEIs consider VLE as the norm for e-learning provision (Derntl and Motschnig-Pitrik, 2004; Gramp, 2013; Sarker et al., 2013; Quinsee and Bullimore, 2011). In a UK survey, Browne and Jenkins (2003) reported that 86% of the HEIs have at least one VLE in use. Moreover, a recent UK survey with 96 HEIs illustrates having at least one VLE in use (Walker et al., 2014). Hence, VLEs are the most common ICT technology used globally for supporting traditional learning in HEIs in blended learning or for distance learning (Alhogail and Mirza, 2011; Diamond and Irwin, 2011; Salmon, 2005). With the continuous evolution and progress of various learning technologies and delivery media, HEIs have come to favour blended learning models over single delivery mode programs (Singh, 2003). However, without an effective implementation addressing users' needs and requirements, failure can be expected. VLEs are often poorly run and students are not always offered training to understand how to use them (NSU, 2010). Moreover, VLE implementation lacks sufficient support for change (McPherson et al., 2006; Pahl, 2003), and not much attention is provided on how to support and manage the change to a successful VLE implementation in HEIs (Alhogail and Mirza, 2011). However, in some cases, VLE is starting to change the students' learning experience (Gramp, 2013). A recent survey (Gramp, 2013) at a research-led university reported that a significant proportion (45%) of students are using e-learning in an enhanced or fully integrated manner; moreover, an enhanced version of the VLE system is being used by the majority of the academic staff. Thus, it can be argued that academic staff members play a vital role in promoting the use of VLE systems in HE.

Hung (2012) reported on the main examples of VLE including Moodle (emerged in 2001), Blackboard (emerged in 2000), and WebCT (emerged in 1995). WebCT was not widely adopted by HEIs until 2003 (History of Virtual Learning Environments, 2009). Furthermore, the literature reports some examples of open-source LMS, such as Atutor, Ilias, Sakai and Kewl (Ssekakubo et al., 2011). The Walker et al. study (2012) conducted by UCISA revealed that numerous VLEs were in widespread use, including: Blackboard Learn, Blackboard WebCT, Blackboard Classic, Moodle, Sakai, SharePoint, Desire2Learn, FirstClass, VLE developed in-house or by commercial or open source, and other commercial or in-house products. Walker et al. (2014) highlighted the current VLEs in-use as: Moodle, Blackboard Learn, SharePoint, other VLE developed in-house, FutureLearn, other intranet based products developed in house, Blackboard WebCT, Desire2Learn, Instructure Canvas, Sakai, other commercial VLE, Coursera, Pearson eCollege, and other open source VLE systems. The results of the two surveys showed Moodle as the leading platform in terms of usage (58% in 2012, 62% in 2014) and Blackboard Learn as the second most acceptable platform (38% in 2012, 49% in 2014), thus indicating a growing consolidation of VLE usage across the HEIs in a smaller range of systems, and it has been noticed that solutions such as WebCT, which were widely used in the past, are now near their end of life. Unlike many commercial proprietary LMS, Moodle excels as an open-source, cost-effective and community supported LMS solution (Sarker et al., 2013).

2.5 Models and Frameworks for E-Learning in HEIs Applicable to VLE System Implementation

An extensive review of existing literature highlights that the terms *model* and *framework* are often used interchangeably (AlQudah, 2014; MacDonald et al., 2001), which highlights the need for a clear definition of both terminologies. Giachetti (2010, p.53) defined a model as "an abstract representation of the real-world system that emphasises some aspects of the system while excluding other aspects". A framework was defined by Johnson (1997, p.10) in two ways: the structure of the framework "as a reusable design of all or part of a system that is represented by set of abstract classes and the way their instances interact"; the purpose of the framework "as the skeleton of an application that can be customized by an application developer". Engelbrecht (2003) highlights that e-learning models serve as the basis for developing frameworks. A model is usually described as a process, representing something existing, while a framework describes what to do and what to consider; it could be composed of chains of stages encapsulating various processes, considering various influential factors, stakeholders involved, challenges faced, associated risks, and integrated tools or technologies. The e-learning framework is an integral part of implementing an e-learning system successfully (Engelbrecht, 2003; MacDonald et al., 2001). As mentioned in earlier sections, an example of an e-learning system is the VLE system. Giachetti (2010, p.29) defined a system as "a set of discernible, interacting parts or subsystems that form an integrated whole that acts with a single goal or purpose". In order to fully benefit from an e-learning system, such as VLE, the education providers have to face challenges of building new strategies for learning and teaching considering requirements from all stakeholders in the education sector (Alexander, 2001; DFES, 2003; Meredith and Newton, 2004). The importance of having a framework in place to ensure successful e-learning implementation is well recognised (Engelbrecht, 2003; Ismail, 2002). Since an e-learning framework tends to provide a basis for the instructional design (MacDonald et al., 2001; Mishr, 2002), offering education providers a detailed understanding of various characteristics of e-learning that are important to be considered for its successful implementation can also provide direction and guidance for the better use of e-learning and how this could be improved (Engelbrecht, 2003). A framework is also significant for realising the necessity of investing in ICT infrastructure in terms of the tools and technologies to facilitate e-learning implementation (MacDonald et al., 2001; Welsh et al., 2003). A framework for the implementation of an e-learning system, such as VLE, could also offer a complete learning environment to distance learners by using the web technology (Mishra, 2002); thus the various processes that need to be understood and applied by course designers throughout the design, development, and delivery of a learning programme must be adequately demonstrated by appropriate education and training (Scott, 2006).

2.5.1 Issues and Considerations for Good Practices in VLE System Implementation

Good practices of e-learning systems implementation, specifically VLE system, have been studied to examine better usability. In order to formalize a framework for e-learning implementation, it is important to look into the good practices that are already in place. Bruck (2010) suggests that best practices are outstanding examples of how ICT can nurture lifelong learning, integrate new learning methods in the traditional education, and facilitate the participation of citizens in information society applications beyond past limitations. Furthermore, implementation of good practices seems to be necessary for encouraging students to be more enthusiastic (Conole et al., 2006). Moreover, it is important to explore issues underpinning such good practices in the literature.

During the 2000s, the use of VLE systems in HEI grew rapidly (Quinsee and Bullimore, 2011). The main reason for implementing VLE systems in HEIs is to facilitate quality e-learning and to enhance the learning experience (Beckton, 2009; Derntl and Motschnig-Pitrik, 2004; Marshall and Mitchell, 2002; Sarker et al., 2013), which requires imbedded strategies on stimulating effective use of the VLE systems (Derntl and Motschnig-Pitrik, 2004; Gramp, 2013). HEIs require a cost-effective and sustainable VLE, which can expand and enhance the learning and teaching experiences of the end-users (Sarker et al., 2013). Yet the VLE system implementation is adopted at a basic level such as for the transfer of electronic documents (Beckton, 2009; Gramp, 2013; Sharpe et al., 2006) and is not utilised to its full potential. Moreover, Quinsee and Bullimore (2011) highlight that most VLE systems are not receptive to the dynamics of learners' demands or technical opportunities, which require careful consideration of continual evaluation by HEIs; also key considerations are not only about the technical factors but also about the opportunities and threats that such technologies bring into e-learning and education in general.

A number of key issues have been highlighted in the identification and evaluation of good practices within the context of successful e-learning and VLE system implementation in HEIs. Ismail (2002) highlights that a key issue with several e-learning projects has been a single focus on the technical process, yielding costly technical implementation, but lacking user acceptance due to lack of user involvement (Govindasamy, 2002; Gramp, 2013; Wild et al., 2002). Therefore, VLE system implementation in HEIs needs to encapsulate technical considerations (Bell and Bell, 2005; Marshall and Mitchell, 2002; Sarker et al., 2013), pedagogical aspects (Beastall and Walker, 2007; Bell and Bell, 2005; Govindasamy, 2002; Gramp, 2013; Quinsee and Bullimore, 2011; Marshall and Mitchell, 2002) and organisational issues (Beastall and Walker, 2007; Bell and Bell, 2005; Gramp, 2013; Marshall and Mitchell, 2002), as shown in Figure 2-1.

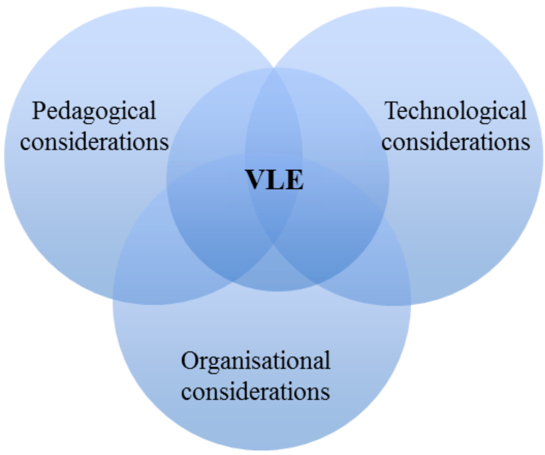

Figure 2-1 Considerations for a Successful VLE Implementation

Figure 2-1 shows that in order to have a successful VLE implementation in HEIs, a combination of related issues underpinning pedagogy, technology, and organisation should be considered (Al-Busaidi and Al-Shihi, 2010; Beckton, 2009; Bell and Bell, 2005; Marshall and Mitchell, 2002; McPherson and Nunes, 2006). It is important to understand an interrelationship among these considerations in an e-learning system, such as VLE, in order to provide a comprehensive e-learning solution.

a) Pedagogical consideration

Considering pedagogical aspects for the implementation of VLE systems in HEIs relates to analysis of content, learner needs analysis, and learning objectives analysis; these include various aspects of e-learning design and strategy (Singh, 2003). The pedagogical aspects affect the methods of organising and implementing teaching and learning processes and course settings by an instructor (Wild et al., 2002). Since e-learning is just another way of teaching delivery using various electronic media, thus ultimately all efforts towards e-learning implementation in HEIs will move towards total automation of administrating the teaching and learning processes by the LMS (Govindasamy, 2002) or VLE to facilitate and empower the learning process inside and outside the classrooms and enhance user experiences. An important prerequisite for the successful implementation of VLE in HEIs is the careful consideration of the underlying pedagogy, or how learning takes place online (learning delivery methods) (Engelbrecht, 2003; Govindasamy, 2002; Singh, 2003). Examples of e-learning methods are listed in Appendix D. In recent times, three learning philosophies have been used and explored widely to provide guidance for instructional practice, namely: behaviourism, cognitive psychology and constructivism; however, out of these, constructivism has been identified as the most suitable one for online learning environment (Khoja et al., 2002; MacDonald et al., 2001; Mishra, 2002). Promoters of new educational technologies highlight the fact that effective teaching via technology needs to be driven by sound pedagogical principles involving critical thinking and by offering a real community to learners in an online environment (MacDonald et al., 2001). The teaching team and the technical design team are equally important as they require awareness about appropriate pedagogical approaches for extending the benefits of teaching and the use of learning environments by students (McPherson and Nunes, 2008).

b) Technical considerations

Considering technical aspects for the implementation of VLE systems in HEIs relates to the identification of various delivery methods and the need for addressing issues with the technology, which is a major artefact around e-learning (Collis and Moonen, 2001; Singh, 2003). These issues include creation of a learning environment and tools to deliver such environment - for example, in terms of the system, resources and infrastructures necessary to support this type of learning (McPherson and Nunes, 2006); this requires a suitable LMS for managing multiple ways of delivering learning. The technical or technological issues are specific to the “e” in e-learning (McPherson and Nunes, 2008), and ensure that the HEI acquires adequate hardware, software, and technological skills that are essential for building an e-learning system (Khan, 2006; Singh, 2003). Examples of such tools and technologies that are integrated with VLE systems are categorised and listed in Appendix C. Although the importance of technology is acknowledged and well-recognised in the development of e-learning systems, it is often overstated – for example when some are arguing, that only deployment of a VLE system is sufficient to implement e-learning in HEIs, which is a misconception causing several problems if it is devolved into a purely technical process; this leads to an expensive software implementation essentially faced with resistance from unengaged employees and lack of usability (Govindasamy, 2002; Gramp, 2013; Ismail, 2002; Wild et al., 2002).

c) Organisational considerations

Considering organisational aspects for the implementation of VLE systems in HEIs relates to addressing issues around organisational, administrative, academic affairs, and student services (Singh, 2003). Furthermore, the organisational consideration includes support for the academic staff from the HEI, such as availability of an assistant to aid academic staff in various tasks while conducting or preparing a course; and availability of additional support in terms of library services and technological infrastructure for assisting academic staff to gain new skills in applying technology in pedagogical practices (Collis and Moonen, 2001). It becomes imperative for an HEI to have an implementation strategy or a methodology for gaining academic staff’s involvement in moving towards more flexible learning; for this an effective manager is needed (Wild et al., 2002). There are other institutional aspects that affect the movement towards e-learning in an HEI, such as the institutional social and professional environment, the leader's management style and vision, past technology-related change experiences of the HEI, and main stakeholders with influence in an HEI (Collis and Moonen, 2001). People who are responsible for academic and educational settings are influenced by the organisational management policy in terms of their relationship to administrative procedures and availability of resources; this impacts on pedagogical models and affects e-learning design. McPherson and Nunes (2006) report that the transition from a traditional learning delivery to the adoption of e-learning strongly involves change management, which is a difficult process not only requiring strong and supportive leadership but also changes in organisational structure and culture; it also needs strong VLE project management (Doherty, 2010).

Some HEIs such as DFES (2004) set a common inspection framework for the organisational work towards excellence in relation to the information learning technology or e-learning. This framework consists of seven questions:

1. How well do learners achieve?
2. How effective are teaching, training and learning?
3. How do resources affect achievement and learning?
4. How effective are the assessment and monitoring of learners' progress?
5. How well do the programs and courses meet the needs and interests of learners?
6. How well are learners guided and supported?
7. How effective are leadership and management in raising achievement and supporting all learners?

These questions are under three themes – managing learning, teaching, learning and supporting learning – by which learning technologies such as VLE systems can assist organisations in their drive to raise standards. Since meeting learner needss is very important in e-learning (MacDonald et al., 2001; Wild et al., 2002), Meredith and Newton (2002) present a model for heuristic development of e-learning that evolved through the literature review of actual practice within e-learning, thus depicting the idea of learning by the experience of doing in order to reach the desired best practice in e-learning environments. They argue that hitherto best practice has not emerged as such; due to the vast range of teaching styles and a variety of potential ways in which technology can be implemented, it is difficult to have a single ‘best practice’ model. Moreover, the academic staff select a problem and then develop a solution using an e-learning type intervention and reflect on their experience which not necessary be completely successful then they keep trying to reach to what they are aiming towards (Meredith and Newton, 2004). Learning projects nowadays include a highly sophisticated means of communication including new media application, interactive virtual reality theatre, virtual desks and highly realistic simulations and so on. Bruck (2010) reports on nine of the best practice e-learning projects (as shown in Appendix A) from around the world, which were selected from entries from 157 United Nations member states and judged by independent expert jury from 34 different countries. Stansfield et al. (2009) mentioned three successful virtual campus projects in the European Commission Education Audiovisual and Culture Executive Agency (EACEA). These projects or e-learning programmes are: eLene-TT - teacher training and the innovative use of ICT in higher education; eLene-TLC - preparing universities for the next generation of students; and eLene-EE - economics of eLearning.

A report prepared by the Institute for Higher Education Policy (IHEP, 2000) mentions six HEIs participating in IHEP Benchmarks for success in internet-Based Distance Education. These HEIs are: Brevard Community College (Cocoa, FL); Regents College Albany, NY; University of Illinois at Urbana-Champaign Urbana, IL; University of Maryland University College Park, MD; Utah State University Logan, UT; and Weber State University Ogden, UT. Several examples of experience and practice are reported in the literature (Meredith and Newton, 2004), with a mixture of successful and failures. Each institution can be distinguished in the ways that teachers design the learning experience and interactions that drive the learning transaction (Garrison and Anderson, 2003). As an example, eighteen of best practice e-learning projects globally as listed in Appendix A. It is worth mentioning that these eighteen e-learning projects are not in a particular order, and are derived from three different e-learning best practice papers that are reviewed and as referenced in Appendix A, highlighting their key features and indicating state-of-the art technology, skills, content, and learning methods that make learning and training solutions effective. There are differences between these various best practices in term of aims and objective, however these eighteen projects have been found to be among the best practices in technology-enhanced learning in the literature. HEIs understand the fact that quality learning is not solely defined by the content of an educational experience but also the context (Garrison and Anderson, 2003, p. 4). Moreover, it is expected that in a good learning experience a student should be able to master new knowledge and skills but also critically examine assumptions and beliefs, and engage in a stimulating, collaborative quest for wisdom and personal, holistic development (Jonassen et al., 1995, p. 7). This could be made feasible by the use of state-of-the-art technologies (MacLean and Scott, 2011). It is argued that an opportunity for learners to work and interact with each other and to build and become part of a community of scholars and practitioners is considered as the most valuable activity in any classroom (Engelbrecht, 2003, p. 41). Moreover, a case study conducted by Bell and Bell (2005) in VLE system implementation clearly highlights that adopting a collaborative and holistic approach, considering both the technical and the pedagogical needs, yields successful results for a VLE system implementation.

2.5.2 Existing Frameworks and Models for VLE System Implementation in HEIs and Critical Analysis

In order to create a meaningful learning environment, several interrelated and interdependent key elements need to be addressed (Khan, 2006; Singh, 2003). An overall framework for guiding the e-learning system implementation (e.g. VLE) and for ensuring improvement in student learning experience in HEIs is still lacking (Marshall and Mitchell, 2002). Moreover, a comparison of various existing e-learning frameworks is necessary to assess their suitability to the learning design (Engelbrecht, 2003; MacLean et al., 2011). This section investigates the existing e-learning framework that applicable to VLE System Implementation in order to extract the key elements of the VLE implementation. Many previous studies, frameworks and models have been reviewed to identifying the success of VLE implementations in HEIs. This review identifies a range of issues that affect a successful implementation and deployment of VLE systems and their long-term sustainability.

MacDonald et al. (2001) pioneered the Demand-Driven Learning Model (DDLM), developed collectively by academics and experts from private and public industries, providing a unifying theoretical conceptualization. DDLM considers learner demands for quality content, delivery, and service that lead to the desired outcomes for learners in HEIs. Figure 2-2 illustrates five main components of DDLM including quality standard of “superior structure” grounded on learner demands and recognises the needs of academic staff and designers; three consumer demands (quality content, delivery, and service); and learner outcomes.

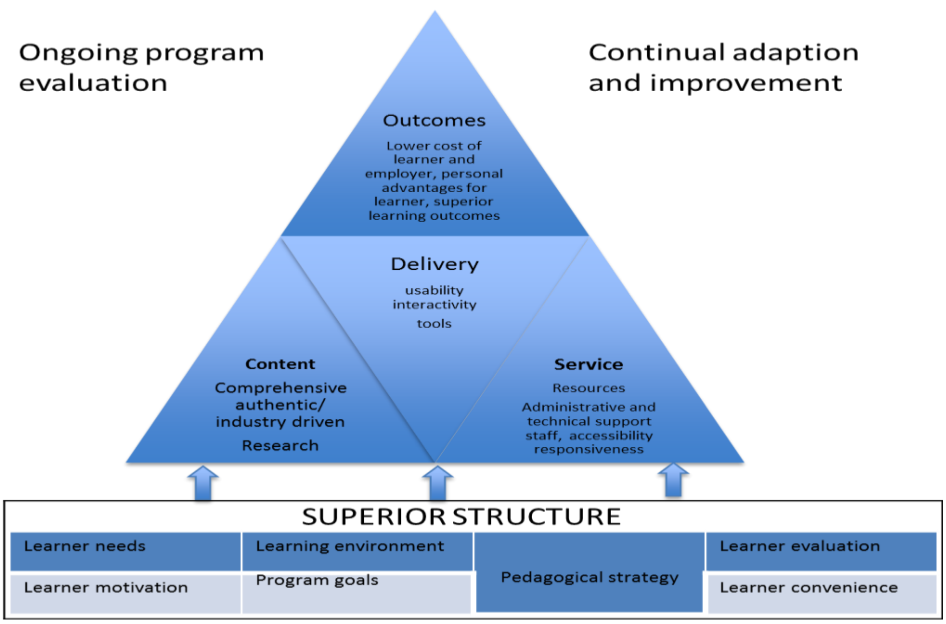

Figure 2-2 Demand-Driven Learning Model

(Adapted from: MacDonald et al., 2001)

This model considers the learner’s demands and the needs of instructors and designers (MacDonald et al., 2001) as a critical factor for successful e-learning implementation. The quality standard proposed in DDLM is intended to enhance web-based learning programs in order for learners to enhance their education using distance learning, which can be applied to a VLE course. Furthermore, as different stakeholders are involved in building this model, it adds advantage to the model in terms of covering a wide range of key elements and different perspectives. While there appears to be an overlap among the four main constructs of the model (content, delivery, service and structure), it offers useful indications of some important stages and processes of a VLE system implementation. Although DDLM considers the pedagogical and technical considerations, which are crucial for the VLE system implementation, the organisational considerations are partly missing that are crucial in order to implement such programmes in HEIs (Beastall and Walker, 2007; Bell and Bell, 2005; Gramp, 2013; Marshall and Mitchell, 2002). Moreover, although learners' needs are a crucial perspective to be considered for a successful VLE system implementation, another important perspective such as instructor's needs and instructor's support should also be highly considered.

Collis and Moonen (2001) presented a holistic model of flexible learning with four key components: technology, pedagogy, implementation and institution, as shown in Figure 2-3. It considers factors for implementation and design, including the technology as well as pedagogy in order to illustrate the complexity of each individual factor and their interrelationship (Meredith and Newton, 2004); it also considers the opportunities and barriers associated with each factor. The size of each ring indicates the level of complexity and number of actors or stakeholders involved; and the nesting of rings indicates their interrelationships (Collis and Moonen, 2001). Smaller rings indicate less complexity and fewer stakeholders, and vice versa. In addition, it demonstrates a model of pedagogy composed of four quadrants of delivery for flexible learning (built around 'U') with lesser or greater flexibility in each quadrant.

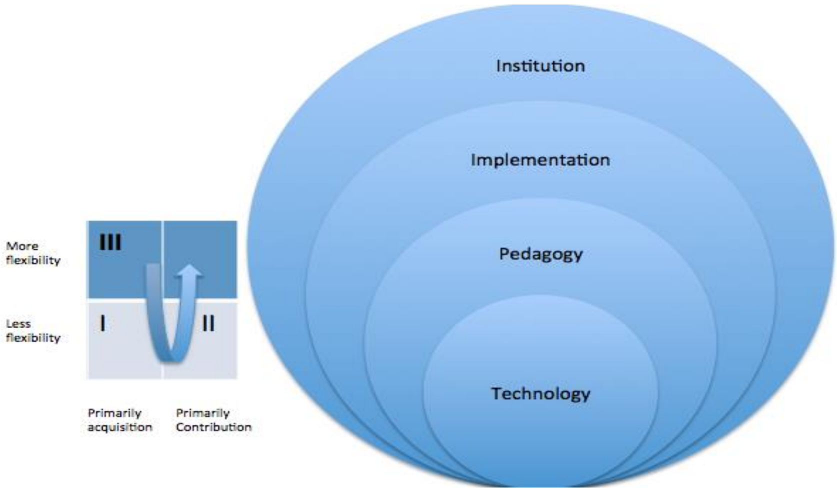

Figure 2-3 Holistic Model of Flexible Learning

(Adapted from: Collis and Moonen, 2001)

This model conveys that the technical aspect is the core for e-learning implementation, which is the major consideration for an e-learning system. Then the second ring of pedagogy indicates the manner in which teaching and learning processes and settings in a course are organised and implemented by an instructor. The third ring is about implementation in practice, which refers to apply technology in pedagogical practices; a pedagogical theory means little if instructors do not apply it, and the technological resources have no value if not used. Finally, the institution circle refers to the influence of institution on the pedagogy and technology. Although this model addresses the most important factors that need to be considered while implementing and design an e-learning system in HEIs, despite of being a holistic view, it is not feasible as it is too ideal for many providers to follow (Meredith and Newton, 2004). Moreover, the implementation elements considered in this model (technology, pedagogy, implementation, and institutions) are too generic and lack details such as the processes followed, critical factors considered, or specific stakeholders involved that are mandatory for composing a VLE implementation framework for HEIs.

The Institute of Electrical and Electronics Engineers (IEEE, 2001), which is considered to be a global leader for setting forward influential standardizations (Derntl and Motschnig-Pitrik, 2004), has put forward an application called Electronic Education Technology as shown in Figure 2-4; it is known as the draft standard or the Learning Technology System Architecture (LTSA) according to this standard model (AlQudah, 2014).

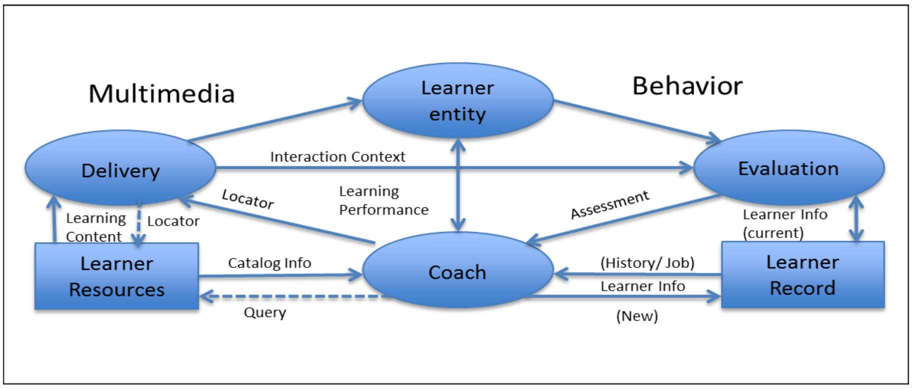

Figure 2-4 LTSA System Components

(Adapted from: IEEE, 2001)

This model presents a wide approach to create a strategy for developing and building VLE systems (AlQudah, 2014; Derntl and Motschnig-Pitrik, 2004). Moreover, it can be used to evaluate the compatibility of a LMS with this standard (AlQudah, 2014). There are three types of components defined in the LTSA: processes, stores and flows. Figure 2-4 presents the system components of the LTSA including processes, presented as the 'oval' shapes, referring to users' and system components that cause changes in the state of the system (e.g. learner entity); two stores, represented as 'rectangular' shapes, are learning resources and learner records; and flows are described in terms of connectivity and the type of information exchanged, and are illustrated as 'arrowed lines' between the processes and stores (e.g. multimedia flow from the delivery process to the learner entity process). The main focus is on the interactions among various system elements, considering the technical aspects regardless of other aspects that a VLE system implementation requires, such as the pedagogical and organisational ones (AlQudah, 2014; Derntl and Motschnig-Pitrik, 2004).

Mishra (2002) presents a design framework for e-learning that has been used for the development of an e-learning program in an HEI for a postgraduate certificate course. As illustrated in Figure 2-5, the framework is composed of three different instructional or pedagogical approaches: constructivism, behaviourism and cognitivism, thus integrating them into one system. It aims at providing a complete learning environment to distance learners by using the web technology.

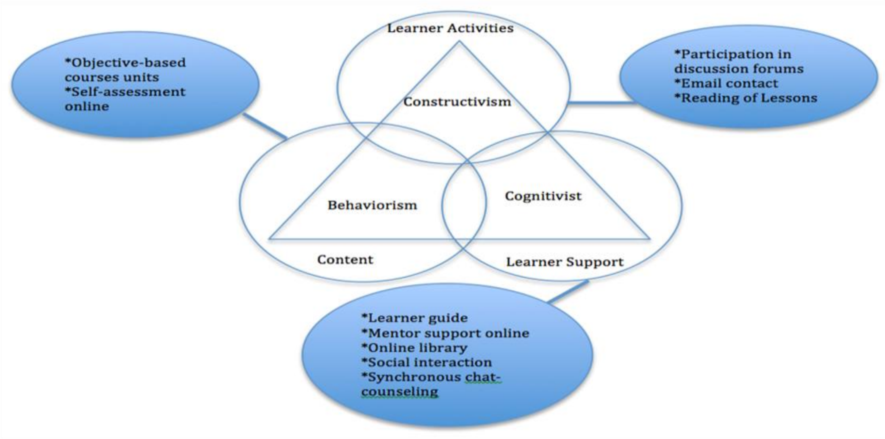

Figure 2-5 Design Framework for Online Learning Environments

(Adapted from: Mishra, 2002)

Although the framework offers a basis for designing instruction and the theory behind specific design by highlighting critical pedagogical factors (such as learner guide and social interaction) that need to be considered while designing a VLE course, it lacks comprehensiveness in terms of covering important technical considerations which is the core of the online learning as well as institutional considerations which heavily influences a successful VLE system implementation in HEIs (Collis and Moonen, 2001; McPherson and Nunes, 2006). Moreover, the type of features that need to be included in a VLE system for a specific course depends on the nature of the course, subject, or topic; therefore it differs from one subject to another. For example, a social science programme requires much discussion and it demands more of constructivist approach (Mishra, 2002).

Another framework for using e-learning as an important tool in knowledge management is presented by Wild et al. (2002) highlighting key elements of effective online education and factors that need to be considered before going online, as shown in Figure 2-6, addressing the pedagogical, technical and organisational considerations. The e-learning value chain represents different stages prior to e-learning implementation in any HEIs; these stages could be applied to the VLE system implementation as well; it also presents important factors for a successful implementation.

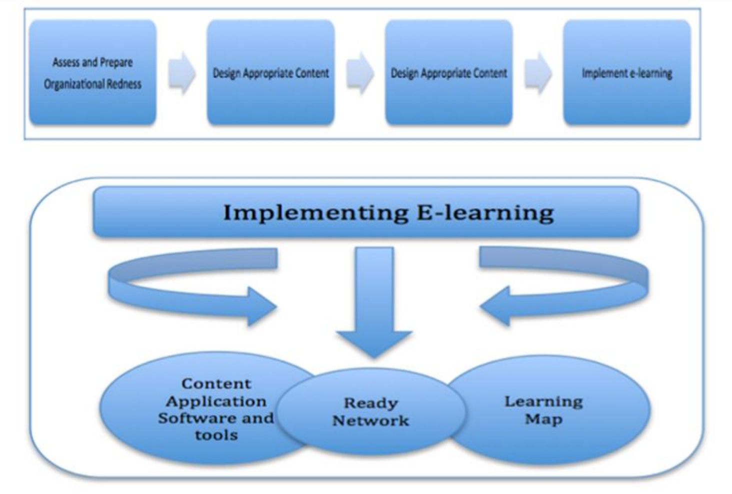

Figure 2-6 A Framework for E-Learning as a Tool for Knowledge Management

(Adapted from: Wild et al., 2002)

Figure 2-6 illustrates that once an organisation has identified its strategic knowledge management requirements, the key stages to follow are: 1) organisation readiness in term of existence of knowledge infrastructure, knowledge editor, organisational culture, employee attitude, knowledge need, computer usage, and technology requirements; 2) design appropriate content for e-learning; 3) design appropriate presentation for e-learning incorporating traditional pedagogy with the advantages of technology to capture, disseminate and share knowledge throughout an organization; and 4) implementation of e-learning that summarises e-learning implementation plan requiring ready network, content application software and tools, and learning map to link e-learning goals to the knowledge requirements of the institution (Wild et al., 2002). Although this framework encapsulates the main elements in the entire process starting from the strategic requirements to the actual implementation and use of the e-learning system, in practice these stages are not essentially followed in sequence and could overlap. Moreover, the framework lacks details within each of these stages that are important to understand the interactions among them; also it does not indicate the involvement of various stakeholders.

Khan's framework (depicted in Figure 2-7) used as a guide to plan, develop, deliver, manage, and evaluate blended learning programs in HEIs (Singh, 2003). Blended learning refers to the integration with traditional ways of learning; i.e. face-to-face learning integrated with online learning experiences (Garrison and Kanuka, 2004; Singh, 2003). Blended learning is adopted widely in HEIs with the support of VLE systems (Beastall and Walker, 2007; Sharpe, 2006; Walker et al., 2014).

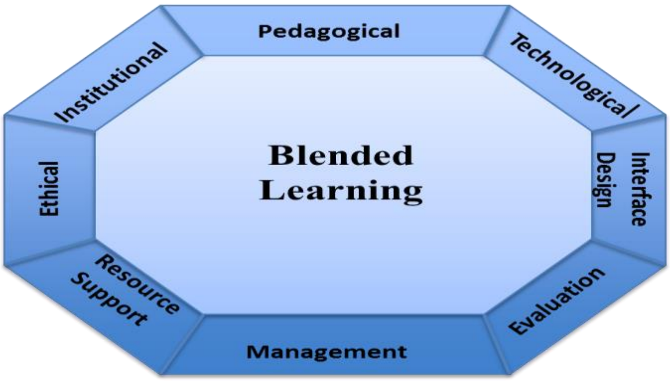

Figure 2-7 Khan's Octagonal Framework

(Adapted from: Singh, 2003)

As shown in Figure 2-7, Khan's framework consists of eight categories, each of which is associated with related issues that need to be addressed, as listed in Table 2-2. These categories could also be classified as stages in an e-learning system implementation.

Categories	*Description*
Institutional category	Addresses issues regarding organisational, administrative, academic affairs, and student services related to e-learning.
Pedagogical category	Addresses issues regarding content analysis, learner analysis and learning objective as well as the design and strategy facets of e-learning.
Technological category	Addresses issues regarding technology infrastructure in e-learning environments, which includes hardware and software. This category addresses the need for the most suitable LMS and LCMS.
Interface design category	Addresses issues regarding page and site design, content design, navigation, accessibility and usability testing.
Evaluation category	Addresses issues regarding learner assessment and evaluation of the usability of the blended program.
Management category	Addresses issues regarding the management of a blended learning program, such as infrastructure and logistics to manage multiple delivery types. This category also addresses issues like registration and notification, and the scheduling of the different elements of the blend.
Resource support category	Addresses issues regarding the online support for the learner as well as the availability of different learning resources.
Ethics category	Addresses issues regarding ethical consideration in e-learning such as culture diversity

Table 2-2 Issues within Various Categories of Khan's Octagonal Framework

As shown in Table 2-2, this framework presents a useful clustering of various important issues that need to be considered to plan, develop, deliver, manage and evaluate blended learning in HEIs, which can be applied through a VLE system. Moreover, this framework highlights the 'ethical' category that is not considered in many other frameworks. This framework offers a comprehensive overview of the main issues associated with e-learning system implementation, highlighting some critical factors; however, it does not highlight the interrelationships and interactions among them.

McPherson and Nunes (2008) present a conceptual framework with a characterisation of five fundamental aspects for the study of e-learning in HEIs: organisational; technological; curriculum development; instructional design; and e-learning course delivery, as shown in Figure 2-8.

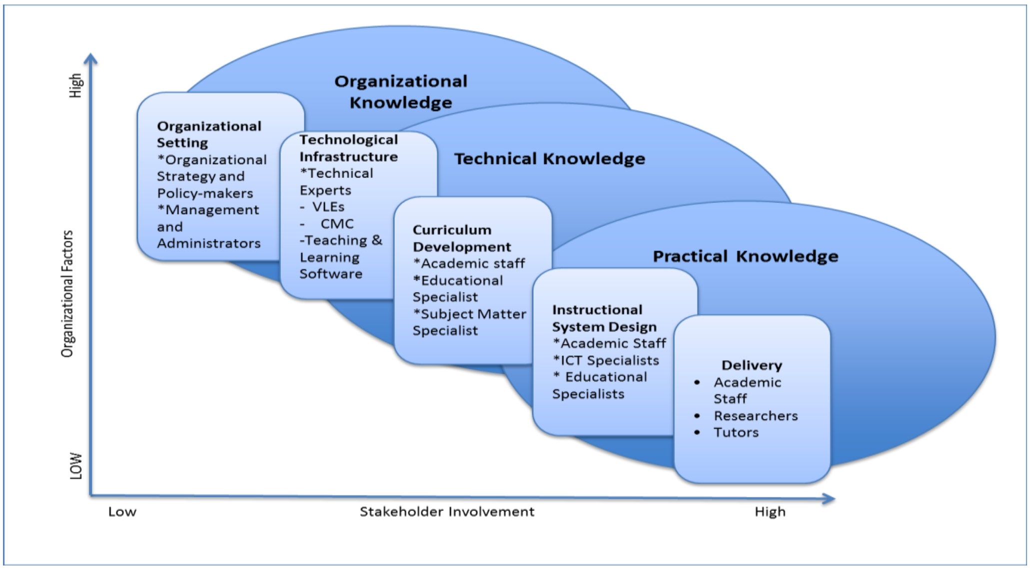

Figure 2-8 Framework for the Study of E-Learning

(Adapted from; McPherson and Nunes, 2008)

This framework allows further exploration and discovery of such elements that are crucial to the success of a VLE system within each of the main categories. Furthermore, it presents a sequence of stages and identifies stakeholders involved in each stage, helping HEIs choose the right people in each. However, some detailed stages and processes are missing in order to cover the entire VLE implementation process in HEIs.

Ssekakubo et al. (2011) present a model to implement LMS in traditional universities that can be applied to VLE systems; it consists of five stages, as shown in Figure 2-9: planning, design, development and evaluation, delivery and maintenance.

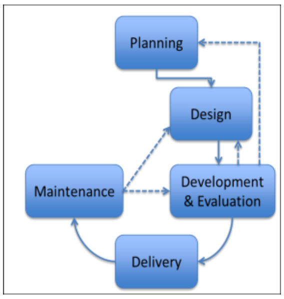

Figure 2-9 Sequencing of the Stages of E-Learning Implementation

(Adapted from: Ssekakubo et al., 2011)

The stages in the model of Ssekakubo et al. (2011) are based on mapping to the six stages for e-learning process suggested by Khan (2004)(planning, design, development and evaluation, delivery and maintenance) and the five stages suggested by Saeedikiya et al. (2010)(diagnoses, decision-making, design, development, delivery and post-delivery). The stages of Saeedikiya et al. (2010) are explained in Table 2-3.

Stage	*Description*
Diagnoses	This stage analyses the current institutional status of the e-learning system. It requires the participation and cooperation of institutional mangers, business managers, and e-learning experts.
Decision-making	This stage is about deciding which LMS fulfils university's needs. In addition, it is used to determine the financial and technical resources of the university.
Design	This stage requires involvement of e-learning experts, technical experts, subject matter experts, and institutional designers for identifying students' requirements and to review course contents.
Development	This stage consists of pilot project of the system that is created in order to detect various functions of the system and to resolve the problems that may emerge during implementation.
Post-delivery	This stage is followed by e-learning system development and considers high involvement of students and instructors.

Table 2-3 Stages Highlighted by Saeedikiya et al. (2010)

The stages highlighted by Saeedikiya et al. (2010) present important steps or stages of e-learning system implementation, some of the stakeholders involved, and the role of various personnel in e-learning implementation, while taking into consideration the educators' role in the success of the e-learning system. However, these are only the high-level stages, with little consideration of the pertinent details and processes associated with each of these stages are missing.

MacLean and Scott (2011) presented the theory-based course design, development and delivery model that is employed at Cranfield University, UK. This model has 10 steps, as shown in Figure 2-10, including various processes that need to be understood and applied by course designers throughout the design, development and delivery of learning programme in general (whether traditional or e-learning).

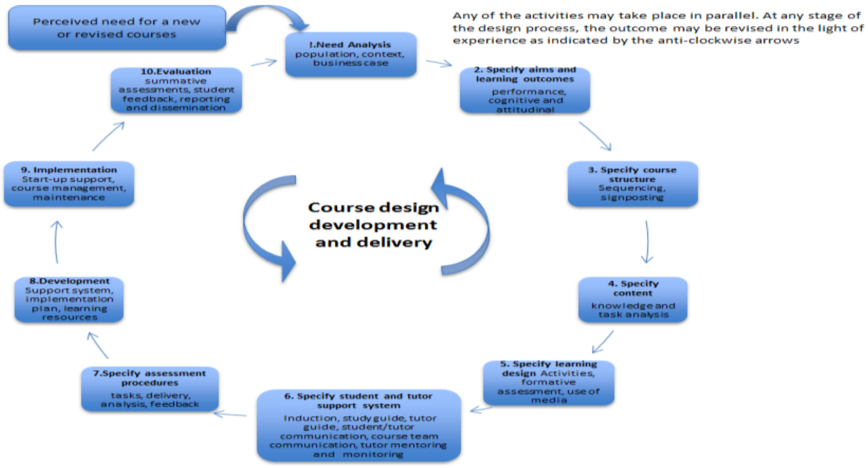

Figure 2-10 Course Design, Development and Delivery Model

(Adapted from: MacLean and Scott, 2011)

Figure 2-10 illustrates a course design, development and delivery process with each step of detail for the typical learning design processes and specifies the various actions from need analysis to evaluate that a learning designer must understand and be able to apply throughout the design, development and delivery of a programme of learning which can be considered as sub-phases or process (Course Design) in a typical VLE implementation. Although this model provides a sequence processes with practical terms and clear description (as shown in Figure 2-10), which can be applied in design, development and delivery a modules in VLE system in HEIs, this model focuses only on a single process of the entire VLE system implementation. Moreover, it does not consider the involvement of various stakeholders, such as academic staff or learners, which is an important factor that needs to be considered in course design (Aimard, 2007; Bruck, 2010; DFES, 2003; MacDonald et al., 2001; MacLean and Scott, 2011; Stansfield et al., 2009).

Alhogail and Mirza (2011) presented a framework for a successful implementation of a VLE system in HEIs that is based on a changing management approach. It considers several good practices in universities globally, as shown in Figure 2-11.

Figure 2-11 Framework for Successful Implementation of VLE in HEI Based on Change Management Approach

(Adapted from: Alhogail and Mirza, 2011)

The model illustrated in Figure 2-11 has been developed based on review of several previous studies and based on actual experiments conducted by universities that initiated change and are related specifically to the VLE system implementation; however, project implementation has not been determined realistically. This framework talks about the tasks necessary for a successful VLE implementation; it does not mention stages. This framework does not mention or specify as to when or how a particular task or process needs to be conducted; i.e. the order or sequence is missing. Moreover, it is more focused on change management and resistance, whereas the focus of this research is on improving the learning design via technology. Furthermore, in order to have strong evidence on the value this model adds to various strategies implemented in HEIs throughout the world, it is important to gather all types of stakeholders with different backgrounds (AlQudah, 2014).

In addition to the aforementioned mainstream models and frameworks (Figures 2.2 to 2.11), this chapter also investigates other models and frameworks that are not directly related to the VLE system implementation, however they are about e-learning implementation in general and could contribute to the development of VLE system implementation framework. One such model is ICOPER Reference Model (IRM), developed by EU ICOPER project, for outcome-based learning designed to improve interoperability of educational systems and applications both at the process and technical levels. IRM contains a description of key process areas for the development, use, and improvement of outcome-based learning in HEIs in the context of Open Education Resources (OER) (Simon et al., 2011).

Alexander (2001) proposed a framework for the successful design, development and implementation of e-learning systems within HEIs highlighting a combination of nineteen factors for developing the capacity to deliver e-learning courses under four categories: university context, teacher thinking, teacher planning, and teacher strategy. Such combination of factors aims at enhancing student's experience of e-learning eventually enabling the HEIs to realise their vision for e-learning. Ismail (2002) presents an e-learning system framework, which is a conceptual model demonstrating the information stream and relations between various modules, as well as the interaction between main processes with the learning value chain. The framework aims to enable HEIs to exchange and make use of information in their e-learning system with third party applications and contents with systematic visualisation methods. It is based on the framework by Wild et al. (2002) for e-learning as a tool for knowledge management (as shown in Figure 2-6); and covers technical and pedagogical development considerations illustrating some important stages, processes, tools, technologies, and stakeholders in the e-learning system implementation. These could also be used in the implementation of a VLE system; however, since it is not specific for HEIs therefore the institutional considerations are neglected. Moreover, some important stages (such as user training) and CSFs are missing that need to be considered in order to implement VLE system successfully.

Khoja et al. (2002) presented an Adaptive Learning Methodology considering the basic elements (such as teacher, learner, subject delivery, and subject content) and their relationship, which is very important in the e-learning process. It shows the various aspects of education, illustrating some CSFs for e-learning implementation such as interactivity and feedback, which is retrieved from the subject delivery to develop the subject contents accordingly. Khoja et al. (2002) provide a model which can be used by instructors to organise the course contents for distance learning based on learner's requirements in terms of the domain knowledge; it also enables to set learning ability criteria and highlights the need for prior training which can be considered as the CSFs for an e-learning implementation. However, it does not consider a wide spectrum of the CSFs, and lacks details about an end-to-end e-learning implementation process as course content present one phase of the entire process, which should not cover the pedagogical consideration only.

Garrison and Anderson (2003) present the Community of Inquiry Model that provides a deep understanding of e-learning characteristics, direction and guidance for the use of e-learning. It focuses on interaction in the learning process among three key elements forming the e-learning experience: social presence, cognitive presence, and teaching presence; these elements or factors must be considered while planning and delivering an e-learning experience in HEIs. This model draws attention to the complexities of interaction in the learning process in VLE systems; however, it seems idealistic (Engelbrecht, 2003) and theoretical. Moreover, this model does not consider the technical and institutional aspects of a successful VLE system implementation.

Ghaleb et al. (2006) proposed a model used in Qatar University for web-based e-learning system using the semantic web technology. It provides students with two kinds of contents: learning content and assessment content; each of which has different type of services as well as providing instructors with several services and tools. This model encapsulates the services for learners and instructors, such as notifications, sharing useful link, submission, interactive tutorial, semantic search, allowing instructors-monitored student performance, and creating course website through a browser. However, new features and functions are included with the new e-learning systems recently to meet student aspirations for instant social networking and mobile learning. Moreover, this model mainly focuses on methods of learning and some tools and technologies and does not provide a step-by-step guide for implementing an e-learning system.

Beastall and Walker (2007) presented an implementation model for VLE development at the University of York. A critical factor highlighted in this model is the requirement for strategic planning at the institutional and department levels.

Smyth (2011) provides a model differentiating between the two types of interactions: learner-content interaction, and learner-learner interaction. It advocates on the merger of planned and non-planned learner-learner interactions, by focusing on technology enhanced learning through the use of video communications that facilitate collaborative e-learning. The model by Smyth (2011) depicts three different contextual influences: least direct, less direct and direct; these are presented by the concentric circles where the influence of the inner circles being more dominant than the outer ones. In this model, technology has the least direct influence and the learning design and curriculum has the direct influence on e-learning. Also, the primary centre of the model is composed of the three intersecting rings: learner, knowledge and connectivity. This emphasizes the significance of connectivity for enhancing knowledge for learners by means of a specific technology, video communications. This model attempts to cover various contextual influences that can be considered as the CSFs for e-learning implementation. However, it lacks implementation details and only focuses on one type of communication technology (video only). Moreover, it does not consider learner-instructor interactions, which are quite significant to a successful e-learning implementation.

Another model called the pedagogy technology model by Lin et al. (2012) represents the information and communications technology integration in education considering two dimensions: pedagogical and technical competency. This model enables measuring teachers' progression in ICT integration and guiding them to higher integration levels. It presents the four levels of the pedagogy dimension: direct teaching, cognitively active learning, constructive learning, and social learning. Although this model addresses both the technological and pedagogical concerns of the academic staff and meets their practical needs, it does not show the impact on student learning and does not focus on the types of tools and technologies that need to be considered for e-learning implementation.

Collis and Moonen (2001) note that an individual's sense of personal engagement with the technology is very important; also, wider engagement of the academic staff with teaching and learning technologies (Doherty, 2010) and fostering learner engagement (Bonk and Cummings, 1998; IHEP, 2000) are crucial in order to successfully implement VLE systems (Beastall and Walker, 2007) in HEIs.

PROLEARN is an Information Society Technology (IST) programme of the European Commission (initiated in 2004) concerned with technology-enhanced professional learning; it was the first so-called ‘Network of Excellence’ bringing together professionals from pedagogical and technical communities to bridge the gap between research and education. The STELLAR project (Sutherland et al., 2012) emerged from the PROLEARN community and focused on advances in TEL through engaging learners and academic staff in new ways of learning. These have been reported as the good practice efforts in the literature.

2.5.3 Limitation of Existing Frameworks and Models for VLE Systems

After thoroughly analysing the existing frameworks and models and critically reviewing them, the key limitations are highlighted to be the lack of detailed stages and processes, the generality of the model, and consideration of only a few CSFs such as flexible learning. Some of the frameworks consider the entire online learning environment while focusing only on the pedagogical aspects and neglect the technical and the institutional considerations (Mishra, 2002). Moreover, some models focus on one or limited phases of the entire implementation process, such as Course Design (MacLean and Scott, 2011). Since models are usually described as a process and something that exists, whereas framework tells what to do and what to consider, the existing frameworks focus only on limited elements where the different perspectives of each element are taken into consideration (Alexander, 2001; Collis and Moonen, 2001; Conrad and Training Links, 2000; Jolliffe, et al., 2001; MacDonald et al., 2001; Mishra, 2002); for example, some mainly consider methods of learning and some tools and technologies and does not provide a step-by-step guide for implementing an e-learning system (Ghaleb et al., 2006; Mishra, 2002), others consider the key elements in too generic way and lack implementation details (Collis and Moonen, 2001), furthermore some consider a subset of CSFs and VLE implementation stages (MacDonald et al., 2001; MacLean and Scott, 2011). AlQudah (2014) highlights the need for VLE implementation frameworks and elaborates their importance to simplify the online learning process in academia. The following table highlights the limitation of the main frameworks and models discussed in Section 2.5.2.

Existing models or frameworks	*Limitations*
Figure 2-2 demand-driven learning model (source: Macdonald et al., 2001)	• Organisational considerations partly missing • Instructor's needs and support should be highly considered • Limited stages and processes addressed
Figure 2-3 holistic model of flexible learning: implementation and design (source: Collis and Moonen, 2001)	• A holistic view without enough detail • Not feasible, too idealistic for many providers to follow • The implementation elements considered in this model are too generic and lack details
Figure 2-4 learning technology systems architecture (LTSA) system components. (source: IEEE, 2001)	• The main focus is on the interactions among various system elements considering the technical aspects, regardless of other aspects that a VLE system implementation requires
Figure 2-5 design framework for online learning environments (source: Mishra, 2002)	Lacks comprehensiveness in terms of covering important technical considerations at the core of online learning as well as institutional considerations • The type of features that need to be included in a VLE system for a specific course differs from one subject to another
Figure 2-6 framework of implementing e-learning (source: Wild et al., 2002)	• In practice, these stages are not essentially followed in sequence and could overlap • The framework lacks details within each of these stages that are important to understand the interactions among them • Does not indicate the involvement of various stakeholders
Figure 2-7 Khan's octagonal framework (source: Singh, 2003)	• Does not highlight the interrelationships and interactions among various key elements
Figure 2-8 a framework for the study of e-learning CMC, computer mediated communication; ICT, information and communication technology; VLE, virtual learning environment. (source: McPherson and Nunes, 2008)	• Some detailed stages and processes are missing and the entire VLE implementation process is not fully covered
Figure 2-9 Ssekakubo et al., 2011 model	• Only high-level stages • Processes associated with each stage missing.
The e-learning P3 model (Khan, 2004)	• Some stages and processes missing; implementation not fully covered
Saeedikiya 2010 framework (Saeedikiya et al., 2010)	• Only high-level stages; processes associated with each stage missing
Figure 2-10 course design, development and delivery design process (source: MacLean and Scott, 2011)	• Focuses only on a single process of the entire VLE system implementation • Does not consider the involvement of various stakeholders, such as academic staff or learners, an important factor in course design
Figure 2-11 framework to a successful implementation of a VLE in a higher education institution	• Does not determine project implementation realistically • Order or sequence is missing

Existing models or frameworks	*Limitations*
based onchange management approach (source: Alhogail and Mirza, 2011)	• More focused on change management and resistance

Table 2-4 Limitations of Existing Frameworks and Models

The existing models and frameworks lack comprehensiveness by either completely ignoring specific elements or not providing enough details, such as focusing only on few stages, processes, CSFs, or technologies used during an e-learning implementation. Table 2-4 lists key limitations of the existing VLE system implementation frameworks, which can be summarised as follows:

- Lack of comprehensiveness in terms of covering the entire implementation from end to end;
- Single-sided focus on either organisational or technological or pedagogical aspects of VLE system implementation, and not all of them together;
- Considering either student or staff perspective;
- Address limited stages or processes of VLE system implementation;
- Lack of interrelationships and interactions among various key elements of VLE system implementation;
- Lack of implementation details in terms of sequence of executing VLE system implementation; and
- Lack of a generic solution which can be customized according to different needs.

So far there has been a lack of a framework addressing the entirety of the implementation process providing guidelines for educational institutions for an end-to-end and successful e-learning implementation such as VLE system. Hence, existing frameworks lack comprehensiveness; furthermore, detailed guidelines or a practical framework for the implementation process of a VLE system are still missing, which is a gap that this research aims to fill. Moreover, this gap is an endorsement that the key elements extracted in this research are important and need to be considered in e-learning implementation in HEIs, such as VLE system implementation.

2.5.4 Key Elements of the VLE System Implementation Identified from Literature

A comparison of various existing frameworks and models is conducted, as shown in Table 2-1, identifying various elements that are considered in the good practice literature while implementing a successful VLE implementation framework. These elements include: stages, processes, CSFs, challenges faced (CLGs), stakeholders involved (SHs), risks associated with VLE system implementation, tools or technologies integrated, and methods. These elements are obtained through intensively analysing the existing literature about relevant frameworks and models, thus extracting the commonalities between them from the context of implementing VLE systems in HEIs. The commonalities obtained are stages, processes, CSFs that need to be considered, CLGs faced, stakeholders involved in each stage, also tools and technologies integrated with the VLE system, and associated risks. Some of these key elements are explained in Appendix B, showing their interrelationships.

Existing models or frameworks	*Stages*	*Processes*	*CSFs*	*SHs*	*CLGs*	*Tools and technologies*	*Methods*	*Risks*
Figure 2-2 demand-driven learning model (Macdonald et al., 2001)	√	√	√	√	√	√	√	√
Figure 2-3 holistic model of flexible learning: implementation and design (Collis and Moonen, 2001)	√	√	√	√	√	√	√	X
Figure 2-4 learning technology systems architecture (LTSA) system components (source: IEEE, 2001)	X	√	√	√	X	√	√	√
Figure 2-5 design framework for online learning environments (Mishra, 2002)	X	X	√	X	X	√	√	X
Figure 2-6 framework of implementing e-learning (Wild et al., 2002)	√	√	√	√	√	√	X	X
Figure 2-7 Khan's octagonal framework (source: Singh, 2003)	√	√	√	√	√	√	√	X
Figure 2-8 a framework for the study of e-learning. CMC, computer mediated communication; ICT, information and communication technology; VLE, virtual learning environment (source: McPherson and Nunes, 2008)	√	√	√	√	√	√	√	√
Figure 2-9 Ssekakubo et al. (2011) model	√	√	√	√	√	√	√	X
The e-learning P3 model (Khan, 2004)	√	√	√	√	√	√	√	X
Saeedikiya et al., 2010 framework (Saeedikiya et al., 2010)	√	√	√	√	√	√	X	X
Figure 2-10 course design, development and delivery design process (MacLean and Scott, 2011)	√	√	√	√	√	√	√	X
Figure 2-11 framework to a successful implementation of a VLE in a higher education institution that is based on a change management approach (source: Alhogail and Mirza, 2011)	X	√	√	√	√	√	√	X

Table 2-5 Existing E-Learning Models and Framework

It can be seen in Table 2-5 that existing models and frameworks (from 2000 to 2014) related to e-learning system implementation, as a whole or partly, highlight the key elements identified in this research; this is an endorsement of the importance of these key elements. These elements are further investigated and described in detail in Chapter 3.

2.6 Summary of the Analysis

Technology is a key element of e-learning (MacLean and Scott, 2011) since it is considered as a support for achieving the desired learning outcomes in a cost-effective way (DFES, 2003; Engelbrecht, 2003; MacDonald et al., 2001; Welsh et al., 2003). Several models emphasise on the role of technology in e-learning (Lin et al., 2012) and highlight the importance of understanding the impact of ICT on HEIs as well as the current teaching and learning practices (DFES, 2003; Engelbrecht, 2003; MacDonald et al., 2001; Stansfield et al., 2009; Snae et al., 2008). E-learning frameworks enable the understanding of the integration of technology and pedagogy and ensure the effectiveness of using various educational tools to enhance the learning process. Since frameworks aim to make the learning process more convenient to the learner and address important pedagogical issues in the information age (Engelbrecht, 2003), they offer a way of how all parties could contribute to the process of change (DFES, 2003). Thus, an e-learning implementation framework could encapsulate various elements such as stages, processes, various stakeholders, challenges, and the CSFs; it could also contain various tools, technologies, or methods of learning to help transferring a traditional institutional learning into blended learning (Singh, 2003). A framework also helps in optimising the use of various tools and technologies in order to enhance the teaching and learning process and to address important pedagogical issues (Engelbrecht, 2003). Moreover, it should identify the needs of users, design and deliver quality-learning materials, and create communities of learners for knowledge building (Engelbrecht, 2003; MacDonald et al., 2001). In terms of the content and services, a framework should also cope with the dynamism of pedagogical changes and needs of learners and instructors (Engelbrecht, 2003). Also, for the effective implementation of online learning there is a need to develop new models of learning to address learner's concerns and technology challenges (MacDonald et al., 2001). Another key analysis of the literature reveals that the ideal product does not exist, but how it is used is important, in other words, it is not about the technology but what is done with it (Quinsee and Bullimore, 2011). Moreover, an analysis of the existing literature highlights that the rate of failure in e-learning projects is disappointingly high where the main cause of such failures is lack of identification of key elements of successful e-learning system implementation and lack of attention to organisational, technical, and pedagogical aspects affecting the implementation of such systems. Therefore, it can be argued that there is a need for developing a framework that considers organisational, technical and pedagogical aspects of the implementation of an e-learning system such as a VLE system. Shachar and Neumann (2003) suggest that the outcome of an e-learning system can be evaluated objectively by assessing the academic performance (Spooner et al., 1999), and subjectively by assessing the satisfaction (Excellence Gateway, 2010; Spooner et al., 1999), attitudes and evaluation of instruction. An important finding of this literature review analysis is that the use of VLE does not itself improve learning, rather, a range of issues are identified which contribute to the success or otherwise of learning and teaching with technology. In order to fully cover the area of e-learning implementation in the HEIs, this chapter also discusses several features and benefits of e-learning including increase in the effectiveness-level of learning. Moreover, considering the good practice projects will help to make the proposed framework more robust and effective. The resulting refined proposed framework can be considered as a guideline for HEIs in order to implement VLE systems successfully.

To summarise the findings in this chapter and to offer justification for the need to build a good practice framework on the implementation and use of VLE systems in HEIs, these following reasons are identified:

1. A conceptual framework that holistically guides the implementation of VLE system in HEIs is lacking.
2. Existing frameworks and models focus mostly on e-learning systems in general and are not specifically for VLE systems (new).

3. Several limitations of existing frameworks are due to their single-sided focus on either organisational or technological or pedagogical side of VLE implementation, rather than considering all of them together.
4. Existing frameworks do not map the stages of VLE implementation with the associated processes and with influential or critical factors.
5. Existing frameworks do not present comprehensive stages of VLE implementation in a sequential order and do not identify interactions among stages and correspondence processes.
6. Existing frameworks do not necessarily consider good practices.
7. Existing frameworks do not comprehensively identify challenges faced, stakeholders involved, and associated risks in each stage of the VLE system implementation

In order to further investigate these issues, this research aims to build a good-practice-in-context framework for the implementation and use of VLE systems in HEIs.

2.7 Conclusion

This chapter is a result of the findings from the secondary data collected about the existing frameworks of VLE system implementation and identifies the gaps found in the literature highlighting the importance of this research. For the literature review, an extensive literature research was conducted spanning a number of academic journals published from 2000 through the end of 2014. Computer databases were also used to identify additional articles, books, and book chapters relevant to the topic. The chapter also presents a review of e-learning capabilities and benefits and examines the existing frameworks in the light of recent developments in online learning leading to the development of a competency framework derived from the results of this research. The VLE system implementation framework is an integral part of implementing a VLE system successfully. An ideal framework addresses the pedagogical, technical and organisational aspects of the VLE system implementation and maps each stage with the associated processes in order to help HEIs to implement the VLE system successfully. Literature reports that several studies have been conducted on the implementation of e-learning system listing many CSFs, methods, processes and frameworks; however, a comprehensive and detailed framework is still missing in the literature. Some of them highlight the CSFs from the learner's perspectives alone while others merely consider the education provider's perspectives. Since each of these perspectives is significant in terms of contributing to the implementation of e-learning, both must therefore be taken into consideration while compiling a comprehensive list of elements which are crucial for building a framework for e-learning system implementation like VLE system. Due to the lack of research into this area, further research is needed for investigating into good practices for VLE implementation. Identifying such elements would lead to more successful implementation of future VLE systems. The research conducted in this thesis focuses on identifying all the imperative elements of such a comprehensive frameworks, including stages, processes, CSFs, challenges, stakeholders, tools, technologies, and methods. Finally, a summary of the analysis is presented, highlighting the limitation of the existing frameworks and justification and rationale for the need to build a good practice framework on the implementation and use of VLE systems in HEIs. Thus, this research bridges this gap by providing a comprehensive framework for VLE system implementation and use, encapsulating all the key elements. This chapter sets the basis for a conceptual framework (presented in Chapter 3) for the VLE system implementation, which is validated in Chapter 6 so as to present a refined comprehensive framework. This proposed framework can potentially be used as a guideline for HEIs for VLE system implementation, involving a structure of putting the system in place as well as managing it, henceforth changing the behaviour of using the system and end-user engagement, while considering sustainability. Based on the past studies and relevant frameworks presented in this chapter, the conceptual framework of VLE implementation is proposed in the next chapter.

Chapter 3: Conceptual Framework for VLE Implementation

3.1 Introduction

The previous chapter discussed issues related to VLE system implementation in HEIs and an analysis of the existing frameworks and models reported in the literature. In order to build a good-practice-in-context framework for the implementation and use of VLE systems in HEIs, it is appropriate to look into the key elements of the VLE system implementation framework. Based on the intensive literature review and analysis of existing frameworks and models conducted in the Chapter 2, this chapter investigates several key elements of a VLE system implementation framework including: stages, processes, critical success factors (CSFs) considered, challenges (CLG) faced in each process, risks associated, stakeholders (SHs) involved in each stage, and various tools, technologies, and methods integrated with the VLE system. These elements provide a deeper understanding of the fundamental issues and success factors underlying the sustainability and successful implementation of a VLE system. Moreover, based on the findings from the literature review in Chapter 2, this chapter presents a conceptual framework for the VLE system implementation in HEIs considering good practices and identifying or exploring related issues. The conceptual framework, which is the main contribution of this chapter, encapsulates the various key elements and depicts interrelations and interactions among them. This chapter also maps various VLE system implementation stages with the corresponding processes and CSFs.

3.2 Conceptual Framework with Key Elements of VLE System Implementation

From the literature review analysis, a gap was identified highlighting the need for a comprehensive framework for the implementation of VLE system in HEIs. A deep understanding of the key issues and CSFs underlying the implementation of VLE is crucial in order to build a good-practice-based conceptual framework to help guide the process of VLE system implementation in HEIs. A comprehensive review of various examples of existing good practices gave rise to the identification of various issues and approaches for achieving successful VLE system implementations. Moreover, it has been elicited from the literature that successful pedagogical and technological interactions provide successful learning and teaching experiences. Since e-learning cannot continue to exist without pedagogical techniques nor without proper learning design in association with important technical considerations, therefore the conceptual framework must consider technical, pedagogical and organisational aspects for the implementation of VLE systems in HEIs. Such combination of factors aims to enhance the student's experience of e-learning (Govindasamy, 2002).

As indicated in Chapter 2, several key elements of a VLE system implementation need to be considered in order to implement an e-learning system such as a VLE in an HEI; this has been elicited through intensive literature survey and analysis of more than twenty e-learning framework and models. The development of the conceptual model and the research framework are based on the findings presented in Table 2-4, which serves the overall research question. Based on the literature review analysis, a conceptual framework for VEL system implementation in HEIs is developed, as illustrated in Figure 3-1. This conceptual framework encapsulates the key elements of the entire end-to-end VLE system implementation that are presented in section 2.5.4 and is built out of the good practices of e-learning systems implementation.

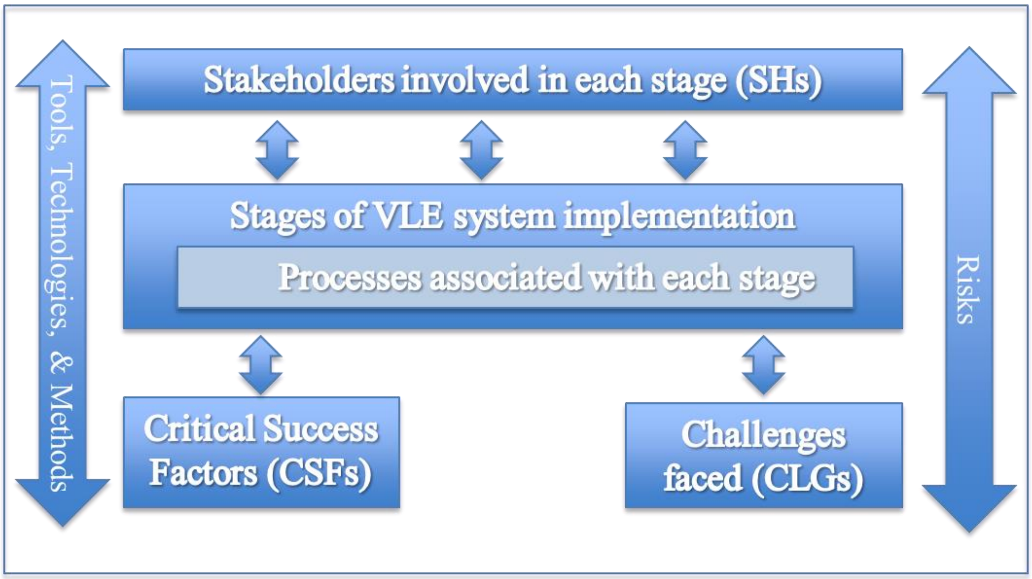

Figure 3-1 Conceptual Framework with Key Elements of VLE System Implementation

It can be clearly seen in Figure 3-1 that the conceptual framework consists of eight fundamental or key elements that are investigated in order to build the conceptual framework for VLE system implementation. These various elements include: stages and process followed; CSFs considered; stakeholders involved; challenges faced; risks associated; and various tools, technologies, and methods adopted which would lead to a conceptual framework for the successful VLE implementation in HEIs. These key elements are interlinked as shown in Figure 3-1, where the stages constitute of associated processes; the stages are influenced by various stakeholders; and they influence various CSFs and challenges of VLE system implementation; the risks associated with VLE system implementation are permeating the entire framework whereas the tools, technologies and methods are associated with some of the stage or processes. This Conceptual Framework developed is constituted of these elements researched; these elements are detailed in the following sub-sections and related Appendix B, C and D.

3.2.1 Stages and Processes in an VLE System Implementation

Stages and processes are the most crucial key elements of a VLE system implementation framework. It is worth mentioning that in the literature the word *process* is interchangeably and ambiguously used with other terms such as *phase* and *stage*, which are not clearly distinguished. For this thesis, a *process* is the task that needs to be performed in a specific *stage* of the VLE implementation; therefore, each stage could contain several processes or sub-processes. Moreover, some of the implementation stages and processes are not explicitly identified in the literature and, therefore, these are elicited as a unique and novel contribution of this research. Appendix B presents various stages in a VLE system implementation mapped with several processes that are reported through literature, which are organised and mapped by the researcher. Noticeably, there is a lack of investigation in processes in the literature although it is one of the key elements of a VLE implementation framework. Moreover, since a specific framework for the entire implementation process of VLE system is missing, some of the stages and processes in Appendix B are extracted from existing e-learning models and frameworks. This could be applied in any e-learning implementation exercise, such as development and evaluation of e-learning content.

Khan (2004) suggests six typical stages in an e-learning implementation process (namely planning, design, development, evaluation, delivery and maintenance) and two phases (content development and content delivery and maintenance). Saeedikiya (2010) suggests six stages named as: diagnosis, decision making, design, development, delivery and post-delivery, in three phases (preparation, operation and post operation) of the implementation of e-learning in HEIs. Moreover, Wild et al. (2002) defines four phases required for e-learning to become an effective knowledge management tool: Phase 1- Organisational readiness, including organisational culture and technology infrastructure; Phase 2- Design appropriate content for e-learning; Phase-3 Design appropriate presentation for e-learning considering characteristics of an effective traditional and online learning; and Phase-4 Implementation consideration including ready network, content application software and tools, and a learning map to link e-learning goals to the knowledge to be gained. McPherson and Nunes (2008) reported five stages of VLE implementation, which are: Organisational setting; Technological infrastructure; Curriculum development; Instructional system design; and Delivery.

Furthermore, Stansfield et al. (2009) identified four levels in relation to virtual campus maturity for achieving best practices in e-learning, which are: Level 1- Virtual campus planning and development; Level 2- Virtual campus evaluation and refinement; Level 3- Virtual campus integration; and Level 4- Organisational transformation. These levels could be considered as the stages of an e-learning implementation at an institutional level. In most cases, the e-learning projects in HEIs are tied with project management. Doherty (2010) outlined project management tactics in order to manage e-learning projects via adapting the agile approach of PRINCE2 (Office of Government Commerce [OGC], 2006) project management methodology. PRINCE stands for Projects in Controlled Environments. It is a project methodology framework that offers an approach with a simple structure to help run projects effectively. PRINCE2 is owned and developed by the OGC. An analysis of case studies in e-learning project management conducted by Pasian and Woodill (2006) revealed seven issues affecting e-learning project success: project management processes should be in place at the beginning, evaluation tools should bookend a project (e.g. pilot program); relationships are key to managing e-learning projects; training and preparation are needed for faculty and learners; risks need to be managed (particularly for relationships); project leadership is important; communications and information flow must be well-managed; and managing projects is equal to managing change.

Although different scholars name the stages differently, the tasks within each stage are generally similar. Appendix B summarises the literature about these stages and maps them with corresponding processes. The stages identified from the literature review findings for the conceptual framework are described below.

a) Review and analysis

This has been referred to as the *diagnoses stage* by Saeedikiya et al. (2010). It consists of a review and analysis of the current situation of e-learning system (Aimard, 2007; Engelbrecht, 2003; MacLean and Scott, 2011; Quinsee and Bullimore, 2011). This stage also includes organisational setting and technical infrastructure referred to in the McPherson and Nunes (2008) framework for the

VLE system implementation. Furthermore, *review and analysis* is the first phase in Wild et al.'s (2002) framework for e-learning. This phase includes several high-level processes and sub-processes that are listed and mapped with related CSFs in Appendix B.

b) Decision making

Based on the analysis conducted, a few critical decisions are made to fulfil the needs of the HEI (Saeedikiya et al., 2010). These decisions include type of e-learning system needed, selected vendor, and mode of learning. This suggests that it is important to consider determining and clarifying students' needs and their expectations from the e-learning system. Moreover, various decisions are made to determine the financial and the technical resources of the university.

c) Planning

This is usually considered as the first stage in a typical e-learning system implementation (Khan, 2004). During the planning stage, the e-learning project plan is created which identifies clearly the people involved, tasks allocations, financial allocations and the product of each stage of the e-learning system implementation. The plan also indicates the estimated completion time for each task and is widely used in e-learning implementation (Sharma et al., 2010; Sharpe et al., 2006). Planning includes several high-level processes and sub-processes that are listed and mapped with related CSFs in Appendix B

d) Design

This stage usually follows the planning stage in a typical e-learning system implementation (Khan, 2004; Saeedikiya et al., 2010). This stage includes designing an in-house VLE system and designing a course module, each of which requires different processes. Moreover, at this stage it is important to review the course contents for pedagogical accuracy and check if they meet the instructional objectives; it is also crucial to choose an appropriate vendor product delivery medium (Ssekakubo et al., 2011). The design stage calls for the participation of e-learning experts, technical experts, subject matter experts, and institutional designers (Ssekakubo et al., 2011). This stage includes several high-level processes and sub-processes that are listed and mapped with related CSFs in Appendix B.

e) Development and deployment

This stage usually follows the design stage in a typical e-learning system implementation (Khan, 2004; Saeedikiya et al., 2010). This stage is built on the previous stages - for example, the deployment of the online courses should be created from the course storyboard that is created during the design stage (Khan, 2004); this can be a module in a VLE system. Furthermore, in this stage the LTSA model (IEEE, 2001) can be used to show a very broad approach in creating a strategy to develop and build VLE system in-house (Derntl and Motschnig-Pitrik, 2004). This stage includes several high-level processes and sub-processes that are listed and mapped with related CSFs in Appendix B.

f) Formative evaluation

This stage usually follows the development and deployment stage in a typical e-learning system implementation (Khan, 2004) and includes conducting pilot study of the e-learning system (Beastall and Walker, 2007; Govindasamy, 2002; MacLean and Scott, 2011). Formative evaluation stage includes several high-level processes and sub-processes that are listed and mapped with related CSFs in Appendix B.

g) Review and bug fixes

Bug fixing is a task in the VLE development cycle (Sarker, 2013); however, it is not explicitly mentioned as a stage in the existing frameworks that are investigated in the literature. Moreover, reviewing the system and improving it based on the results from the pilot study is a task in the e-learning implementation process (Khan, 2004). It has been noted as an important practice in the literature that continuous upgrading is conducted with notable security and bug fixes (Sarker, 2013), this consists of several high-level processes and sub-processes that are listed and mapped with related CSFs in Appendix B.

h) Integration

VLE system should be integrated and compatible with other systems in the HEI (Bell and Bell, 2005; DFES, 2004). The integration stage is not explicitly mentioned as a stage in the existing frameworks examined in the literature; however, it is highlighted as good practice in the literature. Therefore, it is important to consider integration as a significant stage or high-level process in the VLE system implementation framework. Khan (2004) suggests that it is the responsibility of course integrator to put together all the bits related to e-learning within learning management system such as VLE system. Integration consists of several high-levels associated processes and sub-processes that are listed and mapped with related CSFs in Appendix B.

i) Final release and going live

The "final release and go live" stage has been reported as the delivery stage in a typical e-learning implementation for all e-learning systems, which is followed by the evaluation or development stage (Khan, 2004; Saeedikiya et al., 2010). However, it is reported as a generic stage covering different aspects of delivering learning using technology. This includes staffing issues, the delivery model, and training issue (Khan, 2004; McPherson and Nunes, 2008) as well as all the implementation considerations such as network readiness (Wild et al., 2002). All these issues instantiate once the VLE system is ready for the final release. In this stage, the implementation of an integrated learning environment should be completed (Aimard, 2007; Ismail, 2002) and the system should be ready on-time for the end-users in HEI. This stage includes several high-level processes and sub-processes that are listed and mapped with related CSFs in Appendix B.

j) Training and support

Training stage is also not explicitly mentioned as a stage in existing e-learning frameworks covered in the literature; however, it is mentioned as a necessary task for a successful VLE implementation framework (Alhogail and Mirza, 2011). Moreover, the importance of training and support in VLE system implementation in HEIs is well-recognised (Aimard, 2007; DFES, 2003; DFE, 2004; Engelbrecht, 2003; IHEP, 2000; Khan, 2004; MacLean and Scott, 2011; McGill et al., 2014;

Wentling et al., 2000), as responsible for maintaining an effective and efficient learning environment. It includes maintaining the overall VLE system and databases, providing technical support to students, academic staff, support staff, and managing VLE user accounts and network security. Furthermore, it involves providing technical assistance in areas of software and hardware related issues for e-learning and providing support for the course modules within the VLE system. On-going updating and monitoring is a major part of the VLE maintenance process (Sarker, 2013). Therefore, training and support is an important practice, consisting of several high-level processes and sub-processes that are listed and mapped with related CSFs in Appendix B.

k) Continual evaluation

Continual evaluation is imperative to ensure the sustainability of e-learning and hence is an important stage (Aimard, 2007; DFE, 2004; DFES, 2003; Excellence Gateway, 2010; Khan, 2004; MacDonald et al., 2001; MacLean and Scott, 2011; Snae et al., 2008). In a typical e-learning implementation for all e-learning systems, this includes maintenance of the e-learning system in association with its delivery and followed by evaluation (Khan, 2004), which run on a continual basis even after the “go live”.

Even though all these stages appear to be linear, they are practically iterative when actually implemented; this is because of the interactions among various processes and sub-processes. The details of all processes associated with each stage are presented in Appendix B, where the eleven stages and associated processes are mapped in order to build the conceptual framework.

3.2.2 Critical Success Factors of a VLE System Implementation

Critical Success Factors (CSFs) that are needed to be considered in order to achieve a successful VLE implementation in HEIs. In a sense, these factors are a guidelines and considerations. Literature suggests that there has been an enormous amount of research conducted on the implementation of e-learning systems and several CSFs have been identified (Collis and Moonen, 2001; Gunn, 2010; McPherson and Nunes, 2008; McGill et al., 2014; Ssekakubo et al., 2011).

Describing and discussing the CSFs in depth provides a suitable theoretical foundation to underpin the successful implementation of a VLE system within HEIs (McPherson and Nunes, 2008). Engelbrecht (2003) argues that in order to withstand an e-learning initiative and to remain competitive in the dynamic HE market, it is significant to identify issues that determine success. According to Zwass (1998), factors playing a role in the successful system implementations are summarised as: organisation fit, management support, change management, sufficient interaction between developers and users, motivation and training of users, proper management of a system development project, and system quality. Collis and Moonen (2001) discuss a model describing four groups of key factors that enable successful e-learning as institutional environment, educational effectiveness, ease of use and engagement.

VLE systems, like other e-learning systems, require significant effort and planning (Welsh et al., 2003) in order to be implemented successfully in HEIs, where a significant investment in new technology (Excellence Gateway, 2010) with high quality infrastructure (Doherty, 2010; Sharma et al., 2010) is fundamental. Furthermore, identifying clear technology requirements is essential (Beastall and Walker, 2007; Stansfield et al., 2009) when setting up clear and quantifiable targets for the use of e-learning for the curriculum and support teams (DFE, 2004; Doherty, 2010; Sharpe et al., 2006). The focus should be on implications of e-learning implementation on the academic staff and learners (Engelbrecht, 2003; Mascitti et al., 2007), providing on-hands learning with the support of a qualified tutor (Bruck, 2010), such as facilitating enrolment at any time (DFE, 2004; IHEP, 2000), removing barriers to learning (DFES, 2003), facilitating learning rather than controlling or dictating learning (Bonk and Cummings, 1998) and providing extended student services over the internet (IHEP, 2000). Moreover, wider organisational goals must be considered, such as promoting the use of technology and distance education (IHEP, 2000), and embracing e-learning environment (Stansfield et al., 2009). The literature also highlights the importance of establishing a safe learning environment and a sense of community while implementing e-learning (Bonk and Cummings, 1998; Bruck, 2010; Hoidn, 2006; Wentling et al., 2000), such as a steady and encouraging environment (Sharma et al., 2010) for wider adoption of e-learning (Gunn, 2010; McGill et al., 2014). Furthermore, it is vital to identify new trends and innovative technologies (Bruck, 2010; DFES, 2003; Stansfield et al., 2009), such as those provided by Web 2.0, blogs, wikis and podcasting. It is essential to balance e-learning with traditional methods, recognizing their value, and using e-learning only where appropriate to suit individual learning and teaching styles (Bonk and Cummings, 1998; DFES, 2003; Wentling et al., 2000; Wild et al., 2002). E-learning should be widened to more effectively support the development of personal identity, skill development and professional confidence in applying skills in the real-world contexts (Diamond and Irwin, 2011); this encourages practice-oriented research environments (Bonk and Cummings, 1998; DFES, 2003; IHEP, 2000) and most importantly meets the real needs (Beckton, 2009; DFE, 2004; Stansfield et al., 2009). Literature also reports some CSFs for e-learning strategy that emphasises the required integration of business planning and e-learning strategies and employing e-learning strategy to gain competitive advantage (Sharma et al., 2010). Furthermore, e-learning should be part of a holistic teaching and learning strategy for the entire organisation with a clear rationale for its use (Aimard, 2007; Beastall and Walker, 2007; DFE, 2004; Sharma et al., 2010). Ssekakubo et al. (2011) reported some factors for the best practices or successful LMS implementation in HEIs, such as provision of functional user-support units and adopting a bottom-up approach through implementing the system on small units (for example, department or faculty). Once the usability evaluations are satisfactory, the e-learning initiative could be expanded to the entire institution.

Several e-learning technology companies have failed due to the failure of e-learning programmes and the main reason for such failures is the learners' reluctance to adopt e-learning; this is not due to the technology but due to the failure of educators and organisations to create an effective, interactive e-learning experience with quality content (Pailing, 2002; Van Lee et al., 2002). It is imperative to consider the CSFs (Bruck, 2010) that are specific for each stage of the VLE implementation process. Some of these CSFs have been clustered or grouped in a framework (Khan, 2006), aiming to create meaningful distributed learning environments in different categories. The framework has eight dimensions: institutional, pedagogical, technological, interface design, evaluation, management, resource support, and ethical (Khan, 2006; Singh, 2003). However, it does not present a clear mapping of the CSFs to specific VLE implementation stages or processes. In addition, some of the CSFs affect more than one stage or process of a VLE system implementation. Therefore, it was essential to conduct a mapping exercise to understand which CSFs are crucial to be considered in which stage of a VLE system implementation; these mappings are presented in Appendix B.

For the purpose of building a framework for the good practice-in-context in the implementation and use of VLE system in HEIs, several CSFs are identified from the literature for the successful implementation of e-learning systems in HEIs. As indicated in the literature, most CSFs are identified and associated with the institutions analysis stage and the course and content design stage due to their crucial nature. Some of the CSFs frequently reported in the literature suggest the use of combinations of all media including multimedia tools, emerging digital technologies and new media, thus indicating the importance of enriching the e-learning system with all types of media as well as integrating brand new methods of learning in traditional education. The top five CSFs identified in the literature review conducted in this thesis are:

1. Involve all stakeholders including key external decision makers (Aimard, 2007; Bruck, 2010; DFES, 2003; MacDonald et al., 2001; MacLean and Scott, 2011; Quinsee and Bullimore, 2011; Sharma et al., 2010; Stansfield et al., 2009) and form partnerships (DFE, 2004; Sarker et al., 2013).

2. Provision of any administrative or technical support including online help (Alexander, 2001; Beastall and Walker, 2007; Beckton, 2009; Engelbrecht, 2003; IHEP, 2000; MacDonald et al., 2001; McGill et al., 2014; Stansfield et al., 2009; Welsh et al., 2003).

3. Effective training for staff and students, including staff development addressing a variety of needs (Aimard, 2007; DFE, 2004; DFES, 2003; Engelbrecht, 2003; IHEP, 2000; MacLean and Scott, 2011; McGill et al., 2014; McPherson and Nunes, 2008; Wentling et al., 2000).

4. Use combination of all media including multimedia tools, emerging digital technologies, and new media (Bruck, 2010; DFES, 2003; Hung, 2012; Khoja et al., 2002; MacLean and Scott, 2011; Mascitti et al., 2007; Mostefaoui, 2012; Welsh et al., 2003).

5. Interactive contents including e-learning applications, activities and tools (Bruck, 2010; Engelbrecht, 2003; Ghaleb et al., 2006; Govindasamy, 2002; Lewin et al., 2011; Welsh et al., 2003; Wentling et al., 2000; Wild et al., 2002).

A comprehensive list of all CSFs identified in the literature is presented in Appendix B. The interactivity of learners with academic staff, with course contents, and among the learners themselves is crucial to the success of an e-learning system (MacDonald et al., 2001); this could be facilitated by the use of interactive tools and technologies. Section 3.2.6 investigates in depth various e-learning tools, technologies, and methods integrated with a VLE system. The ultimate use of the VLE system can be facilitated with provision of any administrative or technical support including online help, and effective training to staff and student including staff development workshops, addressing variety of needs. As the stakeholders' involvement is amongst the top CSFs for a successful VLE system implementation, it is also useful in our investigation to identify the key stakeholders involved in the implementation process.

3.2.3 Stakeholders Involved in a VLE System Implementation

Involvement of stakeholders is one of the most significant processes in an e-learning system implementation (Aimard, 2007; Bruck, 2010; DFES, 2003; MacDonald et al., 2001; MacLean and Scott, 2011; Stansfield et al., 2009) and has also been indicated as the top CSF in the literature review of this research.

Amongst these stakeholders, the most important are the students (NSU, 2010) and the academic staff (Beastall and Walker, 2007), who play a pivotal role in the e-learning system's implementation.

Table **3-1** shows various stakeholders involved in each of the VLE implementation stages. The enhanced use of technology in education increases the expectations of all stakeholders (MacDonald et al., 2001). The implementation of a fully integrated VLE system needs to have support from the top management such as the Vice-Chancellor and Pro-Vice-Chancellor for Teaching and Learning, and senior managers (Beastall and Walker, 2007; Sharpe, 2006); for this, regular meetings with the staff responsible for the VLE system rollout are mandatory. Moreover, the project objectives need to be communicated from senior management to the VLE implementation group to departmental e-learning champions. Furthermore, a user group should be established in order to achieve synchronisation among different groups of stakeholders and to make technical, organisational and pedagogical considerations across the entire institution for successful VLE implementation (Alhogail and Mirza, 2011). This user group could consist of committed representatives from all interested sectors: technical team, senior management, academic staff from all participating departments, students, and registration staff. Inviting the group's feedback on the planning and rollout of the VLE system could give an excellent perspective on the problems that may arise and what could be done to resolve them (Alhogail and Mirza, 2011; Beastall and Walker, 2007; Sharpe, 2006).

Stage	*Stakeholder involved*
Review and Analysis	• Organisational strategy and policy-makers (McPherson and Nunes, 2008) • Management and administrators (McPherson and Nunes, 2008) • Top management (Alhogail and Mirza, 2011; Beastall and Walker, 2007; Sharpe, 2006) • Technical authors (MacLean and Scott, 2011) • Technical experts (McPherson and Nunes, 2008) • Strategic owners (Sarker et al., 2013) • Director (Khan, 2004)

Stage	*Stakeholder involved*
	• Consultant/ advisor (Khan, 2004) • Learner (Beastall and Walker, 2007; Collis and Moonen, 2001) • Academic staff (Beastall and Walker, 2007) • User group (Alhogail and Mirza, 2011)
Decision making	• Key members of senior management and decision makers (Beastall and Walker, 2007; Gramp, 2013; Saeedikiya et al., 2010; Sharma et al., 2010) • Decision maker (Collis and Moonen, 2001)
Planning	• Director (Doherty, 2010; Khan, 2004) • Project manager/ leader (Beastall and Walker, 2007; Doherty, 2010; Khan, 2004) • Instructional designer (Khan, 2004) • Research and design coordinator (Khan, 2004) • Institutional managers (Ssekakubo et al., 2011) • Business managers/ business developer (Khan, 2004; Ssekakubo et al., 2011) • E-learning experts (Ssekakubo et al., 2011) • Associate dean education (Doherty, 2010) • E-learning coordinators (Sharma et al., 2010) • Key change agents (Sharma et al., 2010) • Staff (Beastall and Walker, 2007) • Head of the schools/ departments (Sharps, 2006)
Design	• Research and design coordinator (Khan, 2004) • Interface designer (Khan, 2004) • Copyright coordinators (Khan, 2004) • Evaluation experts (Khan, 2004) • ICT specialists (Beckton, 2009; McPherson and Nunes, 2008) • Academic staff (McPherson and Nunes, 2008; Doherty, 2010) • Educational specialists (Macdonald et al., 2001; McPherson and Nunes, 2008) • E-learning experts (Ssekakubo et al., 2011) • Technicians (Ssekakubo et al., 2011) • Content/ subject matter experts (Khan, 2004; Ssekakubo et al., 2011) • Instructional designers (Khan, 2004; Macdonald et al., 2001; Ssekakubo et al., 2011) • Learning designers (MacLean and Scott, 2011)
Development	• Academic staff (Doherty, 2010; McPherson and Nunes, 2008; Ssekakubo et al., 2011) • Educational specialists (McPherson and Nunes, 2008) • Subject matter specialists (MacLean and Scott, 2011; McPherson and Nunes, 2008; Ssekakubo et al., 2011) • Course integrator (Khan, 2004) • Programmer (Khan, 2004) • Graphic artist (Khan, 2004) • Multimedia developer (Khan, 2004) • Developer (Collis and Moonen, 2001; Sarker et al., 2013) • Content developer (MacLean and Scott, 2011; Wild et al., 2002) • Photograph/videographer editor (Khan, 2004)

Stage	*Stakeholder involved*
	• Learning objects specialist (Khan, 2004) • Quality assurance person (Khan, 2004) • Learning technologist and facilitators (Doherty, 2010; Sarker et al., 2013) • Technicians (Ssekakubo et al., 2011) • Learning designer (MacLean and Scott, 2011) • Media developers (Khan, 2004; MacLean and Scott, 2011) • Business systems people (Beckton, 2009) • Production coordinator (Khan, 2004)
Formative Evaluation (pilot testing)	• Interface designer (Khan, 2004) • Instructional designers (Khan, 2004) • Evaluation specialist (Khan, 2004; Ssekakubo et al., 2011) • Design and production team (Khan, 2004) • Heads of schools (Doherty, 2010) • Heads of departments (Doherty, 2010) • Academics from the departments that are running the pilot programmes (Beastall and Walker, 2007; Beckton, 2009) • Pilot subjects (Khan, 2004; Beastall and Walker, 2007) • Student (Beastall and Walker, 2007; Ssekakubo et al., 2011)
Review and Bug Fixing	• Interface designer (Khan, 2004) • Technical support specialist (Khan, 2004) • Technicians (Saeedikiya et al., 2010)
Integration	• Course integrator (Khan, 2004)
Final Release and Go Live (delivery)	• Academic staff (Beckton, 2009; Doherty, 2010; Macdonald et al., 2001; McPherson and Nunes, 2008; Sarker et al., 2013; Ssekakubo et al., 2011) • Researchers (McPherson and Nunes, 2008) • Students (Macdonald et al., 2001; NSU, 2010; Sarker et al., 2013; Ssekakubo et al., 2011) • Technicians (Ssekakubo et al., 2011) • System administrator (Khan, 2004) • Course administrators (Sarker et al., 2013) • Server/database programmer (Khan, 2004) • Webmaster (Khan, 2004) • Learning designer (MacLean and Scott, 2011)
Training and Support	• Technical support team (Beckton, 2009; Sarker et al., 2013) • E-learning support team (Gramp, 2013) • It support (McPherson and Nunes, 2008) • Registry team maintaining the mis databases (Beckton, 2009) • Academics educational specialists (McPherson and Nunes, 2008) • Researchers and students (McPherson and Nunes, 2008) • Academic staff (MacLean and Scott, 2011; Stansfield et al., 2009) • External training provider (MacLean and Scott, 2011)

Stage	*Stakeholder involved*
Continual Evaluation	• Technicians (Ssekakubo et al., 2011) • Subject experts (Saeedikiya et al., 2010) • Evaluation experts (Saeedikiya et al., 2010) • Teachers (Ssekakubo et al., 2011) • E-learning champions (Beastall and Walker, 2007; Gramp, 2013) • Matter students (Saeedikiya et al., 2010) • Consultant/advisor (Khan, 2004) • Quality assurance (Khan, 2004) • System administrator (Khan, 2004) • External body for performance improvement (MacLean and Scott, 2011)

Table 3-1 Key Stakeholders Involved in Each VLE Implementation Stage

It is important to involve the right people in each stage of the VLE system implementation. Table 3-1 illustrates that the main stakeholders involved and affecting the successful VLE system implementation can be clustered in four categories: decision makers, VLE implementation team, academic staff, and students; therefore, the case studies conducted in this thesis (presented in Chapter 5) cover all these different stakeholder perspectives.

3.2.4 Challenges Faced During a VLE System Implementation

The successful adoption of ICT to enhance learning can be very challenging requiring a complex blend of technological, pedagogical and organisational components (McPherson and Nunes, 2008). Most difficulties arise due to the fact that the creation, utilisation and support of e-learning facilities require a balancing of tensions among technical, organisational, and pedagogical considerations across the entire institution (Beckton, 2009). In fact, the HEIs are challenged to meet increasing demands and high expectations from students in terms of providing connectivity and high quality learning outcomes (Garrison and Kanuka, 2004). An e-learning system implementation bears several technological and socio-cultural challenges, as identified through the literature. Amongst these, cultural challenges are mostly highlighted by a number of virtual campus projects, often being the case that the academic staff encounter the greatest difficulties in learning to use new technologies; this is often compounded by the negative attitudes of some staff towards the burden of having to learn new skills and master new technologies (Stansfield et al., 2009). Specific challenges are faced at each of VLE implementation stages. Table 3-2 provides a summary of the literature around key challenges anticipated at each of these stages.

Stage	*Challenges faced*
Review and analysis	• The unavailability of data will have an effect on the realization of an e-learning strategy (Sharma et al., 2010).
Planning	• Evaluating existing e-learning initiatives and determining critical success factors (Ssekakubo et al., 2011). • Defining pedagogical and financial plans (Ssekakubo et al., 2011). • Identifying the right people, processes and products of the subsequent stages (Ssekakubo et al., 2011). • Estimating the durations and precedence of tasks (Ssekakubo et al., 2011). • Big amount of planning time involved for online learning (MacDonald et al., 2001).
Design	• Defining students' needs and institutional capabilities (Ssekakubo et al., 2011). • Selecting appropriate delivery medium (Ssekakubo et al., 2011). • Choosing the most effective tools to facilitate learning (Macdonald et al., 2001). • Reviewing course content for pedagogical soundness (Ssekakubo et al., 2011). • Development of a technical infrastructure (Wild et al., 2002). • Design of a knowledge strategy (Wild et al., 2002).
Development	• Managing timelines and communication breakdowns (Ssekakubo et al., 2011). • Taking care of continually emerging issues demanding new changes (Ssekakubo et al., 2011).
Formative Evaluation	• Managing pilot (Ssekakubo et al., 2011). • Conducting formative evaluation (Ssekakubo et al., 2011). • Procedure for summative evaluation (Ssekakubo et al., 2011).
Review and Bug Fixing	• System incompatibility (Collis and Moonen, 2001; Sharma et al., 2010)
Integration	• Integration of new feature in the VLE (Sarker et al., 2013). • Integration bugs (Sarker et al., 2013).
Final Release and Go Live	• Maintaining access control and information confidentiality (Ssekakubo et al., 2011).
Training and Support	• Monitoring and updating of the e-learning environment (Ssekakubo et al., 2011). • Providing the required technical support to users (Ssekakubo et al., 2011).
Continual	• Long-term sustainability (Gunn, 2010)

Evaluation	• Many features and tools of VLE are left unused (Govindasamy, 2002; Gramp, 2013; Wild et al., 2002).

Table 3-2 Main Challenges Faced in VLE System Implementation

Besides the associated challenges at each VLE system implementation stage presented in Table 3-2, the literature also includes the common challenges that HEIs have faced when implementing the e-learning initiatives. One of the major challenges faced is change in organisational cultural and employee attitude (Doherty, 2010; Wild et al., 2002), which causes staff resistance (Alhogail and Mirza, 2011; Beastall and Walker, 2007; MacDonald et al., 2001; Quinsee and Bullimore, 2011; Stansfield et al. 2009), which could be a consequence of a lack of staff members' technology awareness or IT literacy and the lack of professional development and support for gaining confidence in using these technologies (Doherty, 2010; MacDonald et al., 2001; McPherson and Nunes, 2008; Stansfield et al., 2009;). Furthermore, lack of time from the academic staff due to their busy schedule (Beastall and Walker, 2007; Collis and Moonen, 2001; Doherty, 2010; MacDonald et al., 2001; Walker et al., 2012, 2014) is also a challenge, which could be the reason that often many features and tools of VLE are left unused (Govindasamy, 2002; Gramp, 2013; Wild et al., 2002).

E-learning strategic planning demands a significant level of resources, and is as a consequence costly (Collis and Moonen, 2001; Sharma et al., 2010; Wild et al., 2002). In e-learning projects, where management is unwilling to raise costs by implementing a plan, the project will soon become obsolete (Sharma et al., 2010). MacDonald et al. (2001) presented a set of related concerns such as: unpreparedness for program planning requirements, lack of responsiveness to a change in the instructors' roles, lower quality of instruction, uncertain use of materials and resources, and lack of required technical expertise or uncertain access to technical support. E-learning projects require an ultimate aim of facilitating student learning and enhancing the learning experience where changes in teaching methods or mode of delivery are pedagogically driven and based on research (Alexander, 2001; Doherty, 2010), which is a pedagogical challenge. Thus, further research is needed to investigate frameworks that enable integration of various elements of e-learning and to identify aspects of good practices (Mostefaoui et al., 2012) for the implementation of VLE systems.

3.2.5 Risks Associated with VLE System Implementation

Literature has identified many causes for e-learning project failure, such as inadequate consideration of planning, timeline and finance (Alexander, 2001; Arami et al., 2006; Ismail, 2002; Romiszowski, 2004; Russell, 2006). Risk assessment is a crucial factor to the success of VLE implementation (Beastall and Walker, 2007) and has been considered in e-learning development processes in HEIs (Arami et al., 2006; Chiazzese and Seta, 2006; Doherty, 2010; Ward et al., 2010). Literature highlights various project risks in e-learning development in the following areas:

- Failure to find a suitable replacement in case if the e-learning expert unexpectedly leaves the institution (Doherty, 2010);
- Copyright issues concerning resources such as images, sound files, video clips, and animations (Doherty, 2010);
- Failure to understand the characteristics of potential users and requirements (Arami et al., 2006; Doherty, 2010; McPherson and Nunes, 2008);
- Poor infrastructure, for example, if the LMS is unreliable, slow and does not provide “out of office hours” support (Doherty, 2010);
- Time management (not ready in time due to dependency on other tasks) (Pasian and Woodill, 2006; Ward et al., 2010);
- Finance (need to have enough money) (Arami et al., 2006; Pasian and Woodill, 2006; Wallace, 2006);
- System-related risk, technical risk (Chiazzese and Seta, 2006; IEEE, 2001); and
- Bad technological functionality (Chiazzese and Seta, 2006).

Moreover, inadequate learning analysis and design has been identified as another key risk contributing to the failure of e-learning projects (Alexander, 2001; Doherty, 2010; Ismail, 2002). An e-learning system may meet the agreed acceptance criteria and could be completed within the allocated time and budget. However, technologies can act as a barrier to learning if the students do not have the requisite ICT skills to use the system; this is also a potential risk to the e-learning project failure. McPherson and Nunes (2008) mentioned that e-learning system implementation is more likely to face high risks due to the uncertain status of user acceptance; however, this could be overcome through continual training and support (Arami et al., 2006). Moreover, there are potential financial risks when an HEI is considering to expand the online courses (Wallace, 2006). Chiazzese and Seta (2006) summarize some lessons learned from an e-learning degree program carried out by the Faculty of Science of Palermo University, an Italian state university experience; it is suggested that risks should be foreseen in each of the e-learning implementation processes.

3.2.6 E-Learning Tools, Technologies and Methods Integrated with the VLE System

This section is about the tools and technologies integrated with the main e-learning system in HEIs (e.g. VLE system). Technology has driven drastic change in HEIs as the traditional forms of teaching and learning are transformed by Internet or VLE systems. HEIs need to move towards open innovation in terms of organising new ways of activities and instructions, thereby being more responsive and providing competencies at a cognitive, communicative, and collaborative level; this would enable learning at any time and from any place (MacDonald et al., 2001). E-learning tools, technologies, and methods are the key elements of any e-learning system, including VLE systems. These include many forms, which facilitate and support the learning process and have been adopted by several projects in order to improve or enhance e-learning and make the learning process more flexible in terms of time, location, and ways of learning (MacDonald et al., 2001). New technologies are reforming the way of learning (DFES, 2003). Welsh et al. (2003) conducted empirical research highlighting that it is important to include the most recent technology in the e-learning system in order to improve student's achievement. A comprehensive review on the trends of e-learning indicates that e-learning research is still at an early stage and the focus has shifted from challenges about effectiveness of e-learning to the teaching and learning practices (Hung, 2012). The tools and technologies to be integrated with a VLE system should be carefully chosen considering the instructional objectives of the HEI in terms of the benefits and disadvantages of each tool (MacDonald et al., 2001). Bruck (2010) conducted an assessment evaluation of best practice projects for e-learning and highlighted the need to further investigate certain standards, best practice frameworks or models, and quality comparisons. The use of VLE system tools, technologies, and methods makes learning more effective and interactive in diversified teaching. This sub-section reports on the state-of-the-art on these key elements.

MacDonald et al. (2001, p. 22) identified technologies as "intellectual toolkits that help learners build more meaningful interpretations and representations of the world", whereas, methods are defined as the teaching and learning methods to implement various ICT-integrated activities using different tools and teaching strategies (Lin et al., 2012). E-learning systems provide a highly motivating, stimulating, learning environment, and interactive contents (Bruck, 2010; MacDonald et al., 2001). It is expected to incorporate tools supporting social interactions among the students and the academic staff; examples of tools for the social interactions include discussion groups, chat rooms and e-mails. These tools and technologies that are integrated with a VLE system are also expected to support the content interactions between students and course contents; examples of tools for content interactions include video and audio clips, video conferencing lectures, text documents, and journal presentations (MacDonald et al., 2001).

Currently, e-learning technologies include a highly sophisticated means of communication including new media applications, such as the VLE systems to promote teaching and learning activities, interactive virtual reality theatre, virtual desks, and highly realistic simulations (Bruck, 2010). Moreover, various e-learning tools include video tool, multimedia tool, visualisation tools, site collaborative interactive learning, simulation tools, interactive course materials, summative online assessments (such as labs and quizzes), offline simulation tools, requirements recording tools, Moodle Personal Journal tool, and Moodle wiki (Bruck, 2010). Tools such as e-mail, instant messaging, discussion threads, blogs, webinars and wikis provide an environment where knowledge can be shared in a modern way. These allow users to post, review, and respond to comments; sometimes in an immediate, interactive setting, for instance, the Chinese Pod project (Bruck, 2010) enables learners to bookmark lessons of interest and have them delivered daily through personal RSS feed, it also helps to tag vocabulary lists, discover related words tagged by others, stay in touch with the latest lesson discussions in the conversation, and have 'on-demand access to hundreds of lessons, thus offering availability on smartphones and tablet devices with regular content updates and newsletters. Innovative practices such as increased collaboration, group-work, cross-curricular approaches, self-regulated learning, and changes in the roles of academic staff and students are supported by technologies and tools that include learning platforms, social software, collaborative environments, augmented reality, tablet, PCs, notebooks, smartphones and handheld devices, interactive whiteboards, multi-touch surfaces, learner response systems, and games-based learning (Lewin et al., 2011). Appendix C presents the state-of-the art of such e-learning tools, technologies, and Appendix D presents learning and teaching methods that merge to make the learning process more effective. It can be clearly inferred from Appendix C that the interactive tools are most commonly used for e-learning systems, mainly to interactively encourage students to get involved and participate. Similarly, the social networking platforms make studying more fun and not restricted to a particular place or time, and students can interact with the VLE system while they are waiting or walking or even eating. Technology thus enables an enhanced flexibility in learning, adaptive to learners' dynamic and agile living styles. Lecture capture is used widely in HEIs and there is a strong demand from students to establish this technology more widely (Gramp, 2013) as well as to use electronic assignment submissions, and provide grades and feedbacks (Gramp, 2013). Moreover, provision of diagnostic formative quizzes contributes to enhanced feedback to students (Gramp, 2013). The existence of approximately 2.7 billion active mobile phones globally dramatically illustrates the huge potential for mobile learning (Wang et al., 2012). Findings also show that smart phones and Web 2.0 are popular technologies, and Twitter has recently been utilised as a learning tool.

3.3 Conclusion

This chapter presented a conceptual framework for the VLE system implementation in HEIs considering the various good-practices-in-context from the literature review (Chapter 2). The research conducted in this thesis focuses on identifying all the imperative elements of such a comprehensive framework including: stages, processes, CSFs, tools, technologies, and methods. These key elements are integrated and mapped to present a complete e-learning solution for the HEIs. This chapter also explored the interrelationships among these various elements and presented a mapping of various VLE system implementation stages with the corresponding processes and CSFs, which is a key contribution of this research. The conceptual framework captures the interrelationships among various key elements of an e-learning framework and demonstrates that they could be combined to offer a successful VLE system implementation. The framework is validated with the analysis of findings from the case studies in Chapter 5 and then in Chapter 6 the proposed implementation framework is presented for a successful VLE system implementation in HEIs. The proposed framework serves as a good-practice-in-context framework for the implementation and use of VLE systems in HEIs and is generic enough to be considered as a guideline for any HEIs. Moreover, this chapter presented a state-of-the art review of the various tools, technologies, and methods integrated with e-learning systems. Moreover, an extensive analysis of the processes used in e-learning system implementation as well as the CSFs is conducted.

This research aims to build a framework for the good-practice-in-context in the implementation and use of VLE systems in HEIs considering two perspectives: firstly, the student’s perspective (i.e. student’s approach to the implementation of e-learning such as learner's need for and use of new technology and learner's technical competency); and secondly, the education provider's or teaching staff perspective (i.e. instructor's approach to the implementation of e-learning, such as instructor's usage of e- learning system, competency, collaboration and sharing practices). This research investigates the e-learning implementation and proposes a framework with multiple stages and processes where each stage of VLE system implementation is explained, and various key elements are mapped, which are important in forming a comprehensive framework for the entire VLE system implementation. A key contribution of this chapter is the mapping of e-learning implementation stages with respective processes, and CSFs, as shown in detail in Appendix B. The next chapter presents the research methodology adopted for this thesis.

Chapter 4: Research Methodology

4.1 Introduction

Literature reports numerous research methodologies and approaches for a multidisciplinary subject like information systems. In order to choose the appropriate research methodology and develop an appropriate research design for this research, various research methods were studied, investigated and critically analysed. This chapter presents the research methodology used in this thesis for investigating and building a good-practice-in-context framework for the implementation and use of VLE systems in HEIs. Also, for identifying an appropriate research method for this thesis, it was imperative to understand the research philosophy and research approach that best suits this kind of study. Moreover, an insight into the research philosophy enables clarification of the ontology, epistemology and methodology of this research. The methods used for conducting research and validating the research findings are fully explained, illustrating the reasons why the ones adopted are most suitable for achieving the aim of this research. The following sections elaborate on the research design, research philosophy, research approaches, research strategies, data collection methods, and data analysis.

4.2 Research Design

The research design of this thesis is inspired from 'The Research Onion' (Saunders et al., 2003, p. 84) because it explicitly mentions various elements of a research design and the manner in which they are layered upon each other, for example the research philosophy encapsulates the research approaches which encapsulate the research strategy (such as case study) and data collection tools and techniques. Also, in order to select an appropriate research design the elements are selected from outer to inner ring and the section of inner element depends on the selected outer element, i.e. selection of the data collection techniques depends very much on the research strategy. Figure 4-1 illustrates the research design for this thesis.

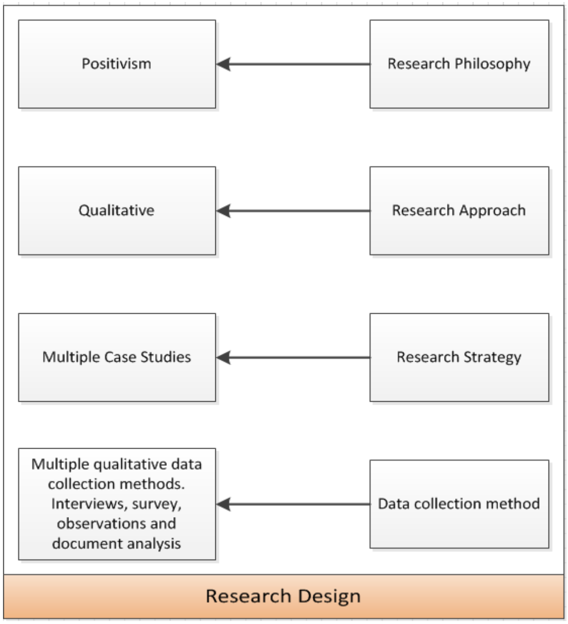

Figure 4-1 Research Design

The rationale for deriving such research design is detailed in the following sub-sections.

4.3 Underlying Research Philosophy

Denzin and Lincoln (2000) described a research philosophy or paradigm as the set of beliefs that direct the researcher's actions in terms of providing direction on carrying out research and making decisions (Guba and Lincoln, 1994). With several research philosophies available, the selection of an appropriate one becomes a challenging task, and it becomes imperative to obtain knowledge about the existing research philosophies before making a suitable selection (Orlikowski and Baroudi, 1991). Prior to choosing a suitable research philosophy for this thesis, three major theoretical philosophies that are most commonly used to study Information Systems were examined: positivism, critical theory and interpretivism (Klein and Myers, 1999; Orlikowski and Baroudi, 1991). These research philosophies are summarised in Table 4-1.

Basic beliefs	*Positivism*	*Realism (critical)*	*Interpretivism*
Ontology: the researcher's view of the nature of reality or being	External, objective and independent of social actors	Objective exists independently of human thoughts and beliefs or knowledge of their existence (realist), but is interpreted through social conditioning (critical realist)	Socially constructed, subjective, may change, multiple
Epistemology: the researcher's view regarding what constitutes acceptable knowledge	Only observable phenomena can provide credible data, facts. Focus on causality and law like generalisations, reducing phenomena to simplest elements	Observable phenomena provide credible data, facts. Insufficient data means inaccuracies in sensations (direct realism). Alternatively, phenomena create sensations, which are open to misinterpretation (critical realism). Focus on explaining within a context or contexts	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions
Axiology: the researcher's view of the role of values in research	Research is undertaken in a value-free way, the researcher is independent of data and maintains an objective stance	Research is value laden; the researcher is biased by worldviews, cultural experiences and upbringing. These will impact on the research	Research is value-bound; the researcher is part of what is being researched, cannot be separated and so will be subjective
Data collection techniques most often used	Highly structured, large samples, measurement, quantitative, but can use qualitative	Methods chosen must fit the subject matter, quantitative or qualitative	Small samples, in-depth investigations, qualitative

Table 4-1 Comparison of Research Philosophies

(Adapted from Saunders et al., 2009)

Based on the characteristics of the different research philosophies presented in Table 4-1, it is clear that positivism and interpretivism have contrasting characteristics. In interpretive research aims at "understanding of the context of the information system and the process whereby the information system influences and is influenced by the context" (Walsham, 1993, pp. 4-5); it focuses on the intricacy of making sense of human responses, actions and reactions (Kaplan and Maxwell, 1994).

Interpretivists believe that all examinations should be carried-out from a participants' perspective to increase the understanding of phenomena within their social and cultural contexts (Orlikowski and Baroudi, 1991). Interpretivism unveils deep insights into the social phenomena; however Winfield (1990) argues that findings from interpretivism cannot be generalised to a larger population. On the contrary, positivist research supports hypothesis generation, quantifiable measures of dependent and independent variables, hypothesis testing, and eventually extracts conclusions from a sample representing the research population (Orlikowski and Baroudi, 1991).

Positivists believe that human action is rational and observation of the phenomena under-investigation can be carried out objectively and rigorously; therefore it could be measured independently of the researcher and the method employed (Avison and Pries-Heje, 2005; Galliers, 1991). Positivism is unprejudiced and focuses mainly on the reality (Benbasat et al., 1987; Winfield, 1990); it assumes an objective external reality upon which inquiry can converge (Hirschheim, 1992). Since this research aims to build a good-practice-in-context framework for the implementation and use of VLE systems in HEIs, which is widely applicable and generalizable universally, therefore the research philosophy deemed to be appropriate and selected is positivism to give guidelines for an objective good practice process.

The positivist philosophy requires an objective rationale, for example, to find the right way to do something, the good practice, or the way to develop something, which makes it suitable choice for this study where good practices of VLE system implementation are investigated. Moreover, this research considers reality as objective, in which the understanding of the phenomenon does not rely only on the researcher's beliefs, but on the objectivity of the respondents' answers. Hence, this study imposes some pre-defined structural processes such as interviews and surveys (as shown in Figure 4-1) for the secondary and primary data collection to examine reality. The next section discusses the type of suitable research approach, which is appropriate to the context of the current study.

4.4 Selection of An Appropriate Research Approach

The selection of an appropriate research approach is a key task during the research design process that requires classifying the purpose of research, whether exploratory or descriptive. Saunders et al. (2009) argue that the answer to a research question specifies the purpose of the research – it could be exploratory or descriptive or both. This thesis addresses the research question '*how to build a good-practice-in-context framework for the implementation and use of VLE systems in Higher Education (HE)?*' In order to address the research question, this study investigates the good-practice-in-context of the VLE systems implementation, and thus is exploratory in nature.

Quantitative research and qualitative research methods are the two most commonly used types of research methods in information systems. The former was developed in natural sciences to test hypothesis through statistical analysis and the later was developed in social sciences to study the social and cultural phenomena (Myers and Avison, 2002). Quantitative methods are mainly applied to address questions about the relationship between calculated variables for a detailed explanation of the phenomenon (Leedy and Ormrod, 2005). Some examples of quantitative methods are numerical methods, survey methods, and laboratory experiments. Klein and Myers (1999) suggest that qualitative research can be conducted in applying positivism, interpretivism, or critical philosophy. There is a growing tradition of using qualitative research approaches to study IS phenomena (Dube and Pare, 2003).

Considering the aim of this research, a qualitative research approach is adopted because it enables the generation of theory from practice (Miles and Huberman, 1994; Myers, 1997) and gaining in-depth understanding of phenomena (Benbasat and Zmud, 1999; Marshall and Rossman, 1999; Silverman, 2010). This research conducts an in-depth investigation on the complexities of the implementation process of VLE systems in HEIs by investigating good practice. Thus, the adoption of qualitative approach for this research seems a suitable approach to gain better understanding of the phenomena under investigation.

4.5 Research Methodology Process

This thesis adopts the research process by Jankowicz (2005) that considers three high-level phases, which are: research design, data collection and data analysis. The research methodology process followed in thesis is illustrated in Figure 4-2, which starts with the identification of a problem area then proceeds to the identification of the research design, followed by the data collection phase.

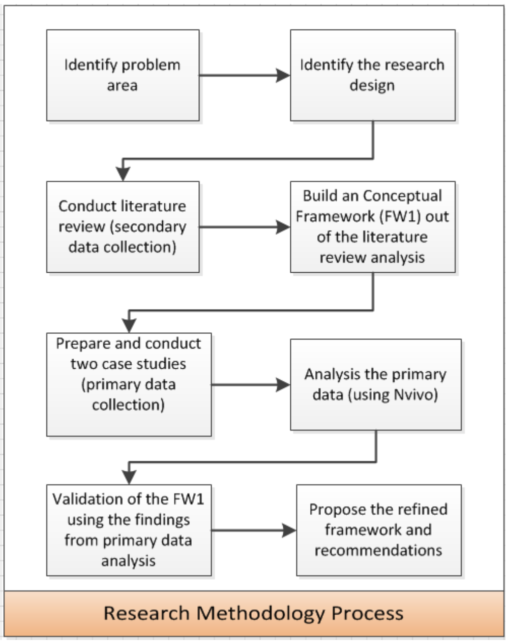

Figure 4-2 Research Methodology Process

The data is collected firstly through conducting literature review (in Chapter 2) and coming up with a conceptual framework (in Chapter 3) out of the literature review analysis, and secondly through conducting two case studies followed by data analysis using Nvivo (in Chapter 5), on the basis of which the conceptual framework is validated and enhanced to propose a comprehensive framework for

VLE system implementation (in Chapter 6). The conceptual framework serves as a basis for the proposed comprehensive framework, which can be considered as a guideline for HEIs on how to successfully implement a VLE system. Therefore, the research conducted in this thesis focuses on identifying all the crucial elements of such a comprehensive framework, including stages, processes, CSFs associated with each process, stakeholders involved and challenges faced in each stage from multiple perspectives encompassing decision makers, VLE implementation team, academic staff, and students. Furthermore, this research examines the state-of-the-art tools, technologies, and methods integrated and supported in VLE systems. It is believed that identifying such elements and their interrelationships will lead to a successful VLE system implementation. The main contribution of the literature review analysis is the initial mapping of VLE implementation stages with respective processes and CSFs (as shown in Appendix B).

4.6 Selection of the Case Study Strategy

In IS case research, positivism is a dominant philosophy that includes descriptive and theoretically grounded case studies (Orlikowski and Baroudi, 1991). Case study is a technique to organise observations and findings in a systematic way and enables a deep understanding of the context of a phenomenon (Cavaye, 1996). The Case study strategy could be conducted by using a positivist or an interpretivist research philosophy because it is adaptable and open to several variations (Dube and Pare, 2003; Stake, 2000). Yen (1994, p. 13) defines the scope of the case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”. The case study strategy has gained wide acceptance over the past decade in the IS field (Dube and Pare, 2003; Klein and Myers, 1999; Orlikowski and Baroudi, 1991) due to several reasons, including the wide use of case research for exploration and hypothesis generation, and also for providing explanations and hypothesis testing (Cavaye, 1996; Yin, 1994). Since case study enables examination of the various factors and their inter-relationships, it is mainly suitable for research into the development, implementation and the on-going use of information systems (Oates, 2006). It combines several qualitative data collection methods, such as interviews, documentation and observation; it could also include quantitative data (Dube and Pare, 2003).

Considering the research question for this thesis, the case study research strategy was chosen as the most suitable. It is quite possible to use a survey approach as part of the case study (Oates, 2006; Saunders et al., 2009). Yin (2003) suggests there are three types of case study investigations: descriptive, exploratory and explanatory, as shown in Table 4-2

Types of investigation	*Description*
Descriptive	Requires a descriptive theory to be developed prior to the start of the research
Exploratory	Aims to develop pertinent hypotheses and propositions for future studies
Explanatory	Suitable for doing causal studies, mainly to test theories

Table 4-2 Types of Case Studies

The case study followed in this research can be classified as exploratory case research because it addresses a particular new set of questions in public sector studies, such as education. Particularly, this causal type of case study (exploratory) was purposefully and specifically selected for the purpose of exploring relationships and links between the key elements of implementation and good practice, and of examining whether it is feasible to establish a good practice framework for VLE system implementation using these key elements. Moreover, it attempts to answer questions with ‘what’ and ‘how’ forms. It is vital for a case study design to consider analysing one or multiple cases. Miles and Huberman (1994) suggest that multiple case studies can enhance generalisability and deepen understanding and explanation. For the purpose of this research, two case studies are conducted at different levels: the national level, considering various UK universities; and the local level, considering one HEI (also in the UK).

4.7 Overview of the Case Studies

Since this research aims to investigate and build a framework for the good-practice-in-context in the implementation and use of VLE systems in HEIs, it intends to cover different levels of detail by conducting two case studies: at the national level (at various universities in the UK), and at the local level (a London-based university). Table 4-3 clearly indicates that this thesis employs positivism as the research philosophy, and a qualitative research approach; the research strategy is “multiple case studies”, and various data collection methods are applied in each case study.

Research philosophy	*Research approach*	*Research strategy*	*Multiple data collection methods*
Positivism	Qualitative	***Multiple case studies***	
		National level	Interviews
		Local level	Surveys Observations Documentary analysis

Table 4-3 Case Studies and Data Collection Methods

Table 4-3 highlights that for the national level case study the data collection is conducted using interviews, whereas for the local level case study the data is collected through surveys, observations and documentary analysis. Each case study is mentioned in detail in the following sub-sections.

4.7.1 Case Study 1: National Level

For the National Level Case Study, the UK was chosen because it is one of the leading countries practicing e-learning (Hung, 2012) thus providing an opportunity to investigate the good practices of VLE system implementation in different UK universities. A study to examine the present situation was conducted by asking interviewees about their experience of the praxis of e-learning (Oates, 2006), in order to gain an in-depth insight into the research topic and help to investigate VLE system implementation in different HEIs. At the national level, fourteen UK universities were selected considering the fact that they have undergone or are currently undergoing the VLE system implementation. Moreover, these universities are quite well-reputed and possess high standard ranking, with most universities consistently ranked as the top 10 UK universities in the national league tables (the *Independent*, the *Guardian*, the *Times* and the *Sunday Times*, 2010 to 2014). These universities were investigated to examine their current system, the date they changed their VLE system, and their current implementation stage, which emphasised the commonalities among them and provided a fresh experience for this study. Investigating these fourteen universities allowed cross-validation across different universities indicating the common aspects as good practices of VLE implementation for all universities under investigation in terms of VLE implementation stages, process, and stakeholders involved, challenges faced, and CSFs considered while implementing VLE systems as well as the best outcome and recommendation from their experiences.

4.7.1.1 Case study plan: National Level Case Study

It was intended to elicit the experiences of all these universities as good practices in order to add robustness to the results of this study. Dube and Pare (2003) advised that case study protocol increases the reliability of the findings. Robson (2002) suggested that a case study plan or protocol has four fundamental components: overview, procedures, questions, and reporting; the case study plan for the National Level Case Study is shown in Table 4-4.

Fundamental components	*Tasks*
Overview	*National level:* aim to provide an overview of the current state-of-the-art of VLE system implementation in various HEIs in uk at the national level
Procedures	Interviews: 22 interviewees from fourteen different UK universities
Questions	*Interview questions*: 44 interview questions about current VLE system; finding the good practices of VLE implementation, stages, processes, and CSFs considered while implementing the VLE systems and the best outcome and recommendation from their experiences (questions are in Table 4-7)
Reporting	Collate information from multiple perspectives and cover different parts of the VLE system implementation with diverse stakeholders

Table 4-4 Case Study 1 Plan

(Source: Robson, 2002)

It can be seen from Table 4-4 that the fundamental components are associated with various tasks conducted for the purpose of this study. Moreover, it is imperative to focus on the procedures for data collection when using a case study approach.

4.7.1.2 Data collection techniques: National Level Case Study

In the case study research, data can be collected through six different sources: documentation, archival records, interviews, direct observation, participant-observation and physical artefacts (Yin, 2003), and can also include "questionnaire survey" (Dube and Pare, 2003). Using more than one data collection methods allows covering the entire phenomenon of interest from all sides, as well as improving the intrinsic quality of the research (Benbasat et al., 1987; Oates, 2006). Therefore, this research used a variety of data collection methods, as shown in Table 4-3, thus making triangulation possible (mentioned in detail in Section 4.11). Saunders et al. (2009) explained that qualitative interviews can be categorised as: structured interviews, containing a complete script and having less flexibility for improvisation; semi-structured interviews, where some questions are prepared before the interview but there is a need for improvements; and unstructured interviews, which are informal and general conversations between the interviewer and participants regarding the research questions. Moreover, interviews are contemporary sources of information in case study based research (Yin, 2003). For the purpose of this study, semi-structured interviews were considered as the most suitable data collection technique (for the national level case study), because in qualitative research interview is one of the most important data gathering techniques (Myers and Newman, 2007). Prior to the interviews, some structured questions and some open-ended questions were prepared to be used as the interview agenda.

a) Semi-structured interviews

Interviews are a means of verbal exchange of information between two or more people, where one person is an information collector and the other person an information provider (Pole and Lampard, 2002, p. 128). Interviews not only enable better understanding about a situation (Saunders et al., 2009) but are also a method which is commonly used in qualitative research (Myers and Newman, 2007). Furthermore, interview is the most commonly used data collection method in positivist case study research (Dube and Pare, 2003).

An open-ended approach enables the interviewees to identify the underlying complexities and issues instead of being directed by the interviewer (Saunders et al., 2009). Hence for this research, the interview questions were mostly open-ended. Participants for the interviews were selected based on their roles in the area of e-learning in the university, and considering the fact that they are directly involved in the VLE system implementation, generally having significant knowledge in the field, and being able to provide all the necessary details required for this study. Therefore, interviews were conducted with decision makers, academic staff, VLE implementation team members, or technical support staff directly involved in VLE system implementation, as shown in Table 4-5. The interview questions were reviewed by the VLE Project Manager and some of the academic staff and e-learning specialists in order to obtain recommendations about the potential interviewees who could respond to the questions effectively and meet the objectives of this study, also this review helped in rewording the questions in order to collect the most relevant data within the shortest time of these interviews.

Job Category	*National Case Study*	*Role*	*Involvement*
Decision maker	Interviewee.1	Head of e-learning of the academic development unit and e-learning coordinator.	Direct
	Interviewee.3	Head of information system technology and the library	Direct
	Interviewee.4	The programme leader for the master's education	Direct
	Interviewee.15	Head of e-learning	Direct
VLE system implementation team	Interviewee.7	E-learning resource developer	Direct
	Interviewee.8	E-learning service manager	Direct
	Interviewee.9	Senior e-learning support officer	Direct
	Interviewee.10	E-learning facilitator	Direct
	Interviewee.13	Learning technologist	Direct
	Interviewee.14	VLE project manager	Direct
	Interviewee.16	VLE project manager	Direct
	Interviewee.19	Learning technology advisor	Direct
	Interviewee.20	Learning technology advisor	Direct
	Interviewee.21	Learning technology advisor	Direct
	Interviewee.22	Senior student advisor in the learning and teaching unite in information system and computing department	Direct
Academic staff	Interviewee.2	Reader in the department of education and technology	Direct
	Interviewee.5	Senior lecturer delivering distance learning programmes	Direct
	Interviewee.6	Researcher in innovation unite related to learning technology	Direct
	Interviewee.11	Course leader doctorate in professional practice	Direct
	Interviewee.12	Senior researcher in projects for e-learning	Direct
	Interviewee.17	Lecturer	Indirect
	Interviewee.18	Senior lecturer	Indirect

Table 4-5 National Level Case Study Participants and their Involvement in the VLE System Implementation

The conceptual framework developed from the secondary data analysis (Chapter 3) was the inspiration for building the questions for the semi-structured interviews. The intention was to elicit the key elements of their VLE system implementation framework and align them with the ones discovered in secondary data (presented in Chapter 2). The questions used were about: what VLE system they were using, how they selected it, whether it was in-house or a vendor product, what processes they followed for the implementation of a VLE system, what critical success factors of VLE implementation were considered, what challenges were faced, which stakeholders were involved, and what tools, technologies, or methods a VLE system should include or support. Specific questions about the implementation process in their universities were then asked, followed by inviting them to describe the good practice of VLE implementation and whether it has been applied widely, occasionally or never. This provided an overview of the current state of the art of VLE systems implementation in UK universities at the national level. Appointments were booked via emails, direct face-to-face interactions in various seminars, and direct telephone calls. Due to the busy schedule of the participants, arranging interviews took longer than expected. Each interview had the same set of questions and the duration for each interview was between 45-75 minutes. The interview started with an introduction about the participant's role and about their involvement in the VLE system implementation at their institution. Approximately twenty-one hours of interviews were recorded, then transcribed and double-checked to ensure data accuracy. The data was structured using narrative through in-depth interviews. Moreover, for confidentiality purposes, the dataset was anonymised so that the interviewees' identities are not revealed.

4.7.2 Case Study 2: Local Level

For the Local Level Case Study, a London-based University in the UK was chosen because it was undergoing the implementation of a new VLE system, thus providing a unique opportunity to observe and capture the real-time implementation of the VLE system. An in-depth investigation was conducted during the end-to-end VLE system implementation to gain fresh knowledge and first-hand experience. Moreover, since this local level case study is mainly focused on capturing the students' and staff's perspectives, expectations, needs, and difficulties in terms of the usability aspects, the participants for this case study are the students and staff belonging to the local-level university.

4.7.2.1 Case study plan: Local Level Case Study

For the local case study, a plan suggested by Robson (2002) was followed, which has four fundamental components: overview, procedures, questions, and reporting as shown in Table 4-6.

Elements	*Tasks*
Overview	*Local level:* aim to obtain a rich, detailed insight into the implementation of the new VLE system in terms of gaining various perspectives from the academics and students
Procedures	Surveys, observations, documentary analysis
Questions	*Questionnaires for staff members and students:* The questions for the staff and the students were almost the same, with slight differentiation in the level of simplicity to make sure students understood it at all levels. The staff questionnaire focused on establishing if, when and in which phase they were engaged in the implementation process. Questions explored their perspectives on the VLE system, their expectations for the new system, the difficulties they faced in using it, the sufficiency of the support they received, the difference between the previous and the new system, whether the system met their needs, what they needed most in the system to support their learning process (e.g. functions, feature), the benefits they gained from the system, satisfaction with the online parts/aspects of their course, how the online aspects of their course could be improved, which technologies or tools could further enhance the system and, finally, their expectations of the future of e-learning in HIEs (questions are in Table 4-7)
Reporting	Information from multiple perspectives and cover different parts of the VLE implementation process with diverse stakeholders

Table 4-6 Case Study 2 Plan

(Source: Robson, 2002)

4.7.2.2 Data collection techniques: Local Level Case Study

The data collection techniques adopted in Case Study 2 include surveys, observations, and documentary analysis as explained below.

a) Observation

For the local case study, three staff training sessions were observed in the local-level HEI. The training sessions were face-to-face, for staff development and to familiarise the staff with their new VLE system. This observation had a narrow focus on a particular type of event, which is staff training. The observation was made explicit: the participants were beforehand made aware that they are being observed. The researcher was a complete observer, observing everything that occurred, but taking no other part in the proceedings as suggested by Oates (2006). The observations were carried out before distributing the survey for the local case study. Following the data collection from observations, further explanation was needed, and for this purpose it was decided to conduct a survey as well.

b) Surveys

A survey contains pre-defined set of questions assembled in a pre-determined order (Oates, 2006). Respondents are asked to answer the questions, thus providing the data that can be analysed and interpreted (Oates, 2006). For this study, online surveys were designed around the new VLE system in place and were distributed in two sets: one for the staff, and second for the students in the local-level HEI. Both sets were piloted with limited number of people to get an idea or to test the questions before distributing the survey (Dube and Pare, 2003). The questions for the staff and the students were almost the same - with a slight differentiation in the level of simplicity to ensure students, at all levels, understood the questions. Also, for the staff survey, there was an interest to know if they were engaged while the VLE system implementation was conducted, their level of engagement, and at which particular stage they were engaged. The general purpose of the staff and student surveys was to explore their perspectives on the VLE system, their expectations from the new VLE system, the difficulties they faced in using it, the sufficiency of the support they received, the differences between the previous and the new VLE system, whether the system met their needs, what they needed most in the system to support their learning process (e.g. functions, feature), the benefits they gained from the system, level of satisfaction with the online aspects of their course and how these could be improved, which technologies or tools could further enhance the VLE system, and their expectations of the future of e-learning in HEIs. In total, responses were received from fifty-four staff and seventy-nine students.

c) Documentary analysis

Official documents are significant information sources, highlighting the interests of organisations and state agencies (Benbasat, et al., 1987; Creswell, 2009). Therefore, documentary analysis was conducted in order to complement the data acquired from observations and surveys. These documents are reports from before and after the transformation period and throughout the VLE system implementation.

4.8 Sample Selection

In order to answer the research question and meet the research objectives, the choice of the right sampling technique depends on the nature of research method. Saunders et al. (2009) listed two types of sampling techniques: probability sampling, a technique often used in quantitative research; and non-probability (purposive) sampling, primarily used in qualitative studies. For this research, the latter was adopted as it enables choosing the most suitable cases to answer the research question and meet the research objective (Saunders et al., 2009). The sample was chosen based on the fact that these universities are well-reputed and possess high standard rankings, with most universities consistently ranked as the top 10 UK universities in the national league tables (the Independent, the Guardian, the Times and the Sunday Times 2010 to 2014), rendering them germane to consideration of good practice experience of VLE system implementation. Furthermore, all the universities investigated in this research are in the process of implementing new VLE system, which enabled gaining fresh and precise information from real life experience. In order to be inclusive and comprehensive, as many universities as possible were covered, and the total number of universities investigated in this research is fourteen different universities from UK.

The data collection methods used were mainly interviews and survey. The sample size in order to ensure a sufficient number of interviews can be determined in this method when data saturation is reached (Saunders et al., 2009), which in this case was with a total of twenty- two interviews. Participants for the interviews were selected based on their roles in the area of e-learning in the university. Moreover, these participants were selected considering the fact that they are directly involved in the VLE system implementation, they generally have significant knowledge in the field, and are able to provide all the necessary details required for this study (Saunders et al., 2009). Therefore, the interviewees are decision makers, academic staff, VLE implementation team members, or technical support staff directly involved in VLE system implementation. The survey was conducted to collect more data and complete the findings from the interviews, focussing on in-depth investigation with the main end-users of VLE system (student and staff). The total number of responses from the online survey is one hundred and thirty-three.

4.9 Qualitative Data Analysis

In order to find answers to the research question, data analysis is conducted which is to categorise, examine, tabulate, test, or recombine the data collected (Yin, 2003). All the qualitative data collected (via surveys, interviews, observations, and documentary analysis) was condensed (summarised), grouped (categorised) or restructured as a narrative to support meaningful analysis (Saunders et al., 2009). Also, making diagrams and deriving statistics in qualitative analysis was possible by considering the frequency of occurrence of certain categories of data (Saunders et al., 2009). As mentioned by Yin (2003, p. 142), an overall analytical strategy is imperative prior to conducting a case study analysis; these strategies also allow to define priorities in terms of what should be analysed and why. Analysis of the primary data has been based on the conceptual framework for VLE system implementation developed in Chapter 3. As mentioned by Saunders et al. (2009, p. 488), "data collection, data analysis and the development of propositions are very much an interrelated and interactive set of processes". Therefore, the analysis of primary data took place during and after the collection of data. Various techniques were applied such as categorisation (grouping) of meaning and structuring (ordering) of meaning using narrative by developing themes (such as the key elements including stages, processes, CSFs, challenges, stakeholders, technologies, tools, and methods) and subsequently attaching these themes to meaningful amounts of data (Saunders et al., 2009). Moreover, the derived names of these themes are from terms used in existing theory and literature, which were used in the surveys and interviews. This potentially helped in analysing the data using the same themes. Furthermore, summarising (condensation) of meaning was used for summarising the CSFs and a summary of the key points that involves reducing the meaning of large amounts of text into fewer words was produced (Saunders et al., 2009). Oates (2006) mentions that case study can be used to build a new theory, framework or model, which can be then applied to another situation; this is one way of linking the theory to the case study.

Table 4-7 illustrates how the questions in the interviews and surveys are related to the proposed framework. Some of the questions directly investigate the key elements and other questions are supporting questions to find more CSFs. These questions are based on the findings presented in Section 2.5.4, which are structured to form the main themes for qualitative data analysis; these themes are stages, process, challenges, CSFs, risks, and tools, technologies and methods. In this study, the Nvivo software for qualitative data analysis is used to support the development of the coding system for data analysis. NVivo (Bazeley, 2007) is a software tool that supports qualitative and mixed methods research. It supported the tasks of organising and analysing content from interviews, surveys, and observations. Nvivo assists in managing data, querying data, graphical modelling and reporting from data (Bazeley, 2007).

Information required	*How information is collected*	
	Semi-structured interview questions	*Survey questions*
Common trends	How would you describe the best practice of VLE implementation? Has this practice been applied widely, occasionally or never? In your view, is the way teachers employ technology to support learning the measure of e-learning effectiveness? Or is the system, or a combination of both, or something else? What framework or model did you follow for your VLE system implementation?	*Student:* what else do you need in your current VLE system to support your learning process? Or to help you learn more effectively? Is there any feature or function you need and cannot find?
CSFs	Could you please list critical success factors of VLE implementation? What do you like and dislike about the previous and current VLE system? Were there any events, drivers or factors that supported the project in reaching its goals? And what were they? How can a suitable VLE system be selected for HEIs? What needs to be considered?	*Staff:* could you please list critical success factors of VLE implementation? In other words, what make any VLE system successful *Staff and students:* what benefits have you gained from using VLE system? *Students:* are you satisfied with the online parts/aspects of your course?
Stages	What stage of VLE system implementation are you at? What stages or steps were followed for your VLE system implementation lifecycle? Which process was given more importance during each stage and why? Literature suggests that there are several lifecycle stages while implementing systems such as VLE. Can you think of any other stages that you came across while implementing VLE technological solutions?	
Process	If it is an external vendor product then how did you select a vendor? (Process, procedure) based on what? (Time, quality, cost…) How long was the implementation process expected to be? Are there any timescales? What do you consider as a crucial step in the VLE system implementation lifecycle?	*Staff:* what should the decision process be for selecting a suitable VLE system? What aspect would one have to consider?
Tools and	In your opinion what is the most effective tools, technologies or methods	*Staff:* what technology do you see as a key enabler that

Information required	*How information is collected*	
	Semi-structured interview questions	*Survey questions*
technologies	that VLE system should include or support? In general What technologies do you see as promising key enablers for learning solutions? What technology contributes to form e-learning?	VLE systems should include or support? (ranking on the scale) *Student:* in your opinion, which technologies and tools can enhance, further the VLE system?
VLE implementation and risks	When was last time you changed the VLE system in your university? Did you support the decision of changing the VLE system? Why? Is it an in-house or external vendor product? Was that a strategic decision that time? What level of support was needed from top management and what resources needed to be allocated? Is there any resistance from the staff or from the students to change the traditional way of teaching and learning? In your opinion, why? Do you deploy risk analysis to decrease potential threats of risk? What is the strategy and at what stage in lifecycle? Please list the top 3 points for: Benefits to HEIs if VLE is successfully implemented. Risks associated with VLE system implementation	
Important function and features of VLE system	Does VLE system meet your needs? What do you like and dislike about your current VLE system (e.g. features, functionalities)? What was your first impression when you start using it? What do you expect from the new system?	*Staff:* what do you expect from the new VLE system in term of feature and usability? Please briefly provide your preferences *Staff/student:* How does VLE meet your needs? *Student:* What do you expect from the new VLE system? What else do you need in VLE to support your learning process? Or to help you learn more effectively? Is there any feature or function you need and cannot find on VLE? How could the online aspects of your course be

Information required	*How information is collected*	
	Semi-structured interview questions	*Survey questions*
		improved?
Stakeholder involvement	Are you involved in VLE implementation directly/ indirectly? Did you support the decision of changing the VLE system? Why? At what stage of your VLE system implementation the university staff was engaged? What are the stakeholders for the VLE system? Which once are the most important? Why they are important? How should stakeholders in HE be identified? How does your university capture the end-users' feedback and make any change in the implemented VLE system?	*Staff:* at what stage of the VLE system implementation you were involved, if at all, and how?
Challenges	Please mention some of the major events or factors and challenges faced in the implementation of VLE system? Do you feel any difficulties with your current systems? If yes, what? Any limitations on the existing framework or model?	*Staff/student:* please list any difficulties you have experienced or any limitation that VLE has?
Training	How many training steps? And for how long each? Do you belief that the training sections are effective? Easy? Is the support you are receiving sufficient or you need different supporting resource?	*Staff/student:* are you receiving sufficient support from VLE system or you need other supporting resources? What other support would you require?
Future	What is the requirement for the future enhancement in VLE systems? What new forms of learning (NFL) are expected to emerge in the future of e-learning?	*Staff:* what new forms of learning are expected to emerge through VLE in future in the HEIs *Staff/student:* what do you expect from the future of e-learning in HE?

Table 4-7 Correspondence between Case Study Questions and the Framework

For this research, the data analysis was conducted in five different phases: preparation for using Nvivo and creating a project in Nvivo; entering data sources into Nvivo; organising and coding the data; analysing and querying the data; and finally drawing answers from the data. The stages are explained as follows:

i. Preparation for using Nvivo and creating a project

This involves attending workshops and seminars in using Nvivo, and also reading different resources not only the material provided in the workshops but also additional resources (e.g. *Qualitative Data Analysis with Nvivo*, Bazeley, 2007) as well as online tutorials. Therefore the necessary knowledge required for using Nvivo tool was obtained first and then a project was created in Nvivo for the purpose of analysing data from this research.

ii. Entering data sources into Nvivo

After creating a project, the data was entered into the Nvivo sources section, containing all the primary research materials, interview transcripts, staff survey, student survey, and observation notes; it also contained a memo to record the idea, insight and growing understanding of the material in the project while conducting the analysis, which facilitated the writing-up. Moreover, using the node classification function of Nvivo (Figure 4-3), some attributes are associated to each participant.

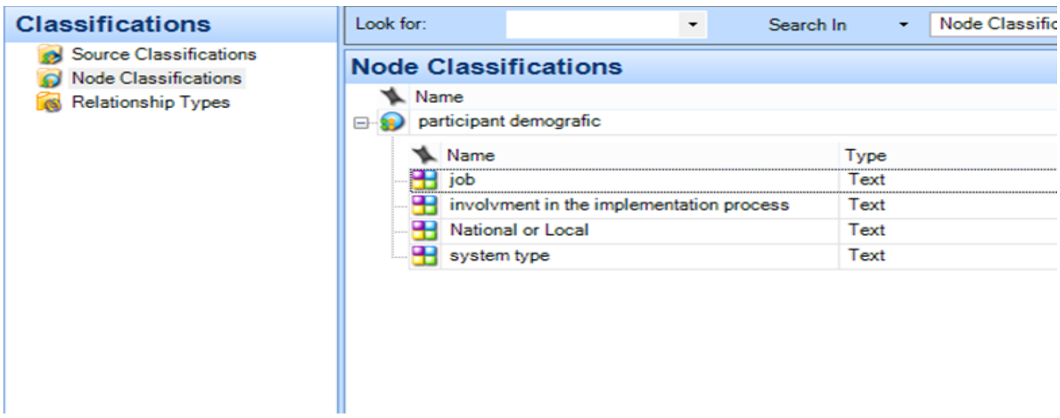

Figure 4-3 Node Classifications

Figure 4-3 shows various attributes such as job role, involvement in VLE system implementation, national or local level case study; such classifications have impact when analysing the data as attributes have set values with corresponding classifications.

iii. Organising and coding the data

This phase involves extracting themes from the data sources and applying coding. The initial coding was performed with main themes extracted from the interview and survey questions, which enabled the validating and refinement for the proposed framework. Moreover, in Nvivo, coding allows the grouping of related concepts to be organised in containers called ‘nodes’ and sub-containers called ‘child nodes’, as shown in Figure 4-4.

The main themes and relevant sub-questions were build-up and developed from Table 2-5 in Section 2.5.4. The nodes and child nodes formed were strongly related to the themes of this research such as stages, processes, CSFs, challenges (CLG), stakeholders involved (SHs), risks, tools, technologies and methods. Based on the conceptual framework, the data were coded and categorized under similar themes or concepts and refined throughout a series of analyses. These codes corresponded to the individual dimensions described in the conceptual framework. Categories were compared to discover connections between themes. Concept maps were drawn to understand the relationships among various concepts or key elements involved in the VLE system implementation in HEIs.

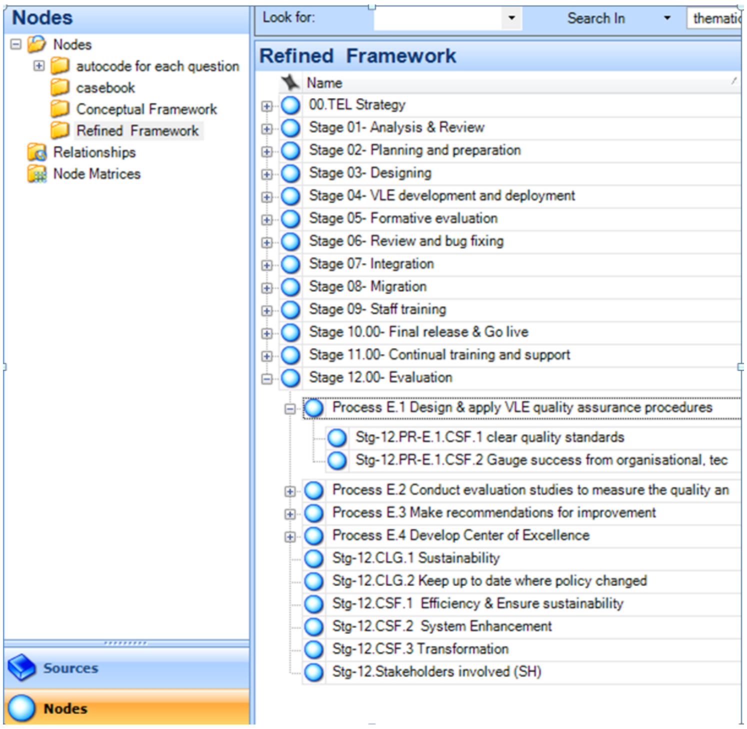

Figure 4-4 Formation of Nodes and Child Nodes in Nvivo

iv. Analysing and querying the data

The formation of nodes is conducted in an interactive manner as more themes emerge while proceeding the coding such as TEL strategy. This involves merging the initial codes, changing places, and renaming to form the eventual structure of the proposed framework based on the findings from case study data. Moreover, higher order themes are concluded from the lower category by creating 'sets'. From the case study data, thirteen high level nodes where generated, as shown in Figure 4-4, each of which has child nodes.

The analysis includes mapping each stage of the VLE implementation with corresponding process, CSFs, CLGs, and stakeholders involved in each stage, thus reflecting the good practices extracted from the data to eventually establish the final structure of the proposed framework (as presented in Chapter 6). Furthermore, the relationship (impact or association) among various nodes was captured during the analysis and visualized in the proposed framework. Using different queries in Nvivo enabled the generation of different types of data analyses, such as the proportion of effectiveness of the VLE system training sessions, students' responses on further support and resource required, and the level of staff and student satisfaction with the VLE system; these analyses are presented in detail in Chapter 5.

v. Representation of answers from data

Finally, Nvivo assisted in organising the data and drawing conclusions in various forms and visualisations such as pie charts, graphs, and tabular format presented in Chapter 5.

After conducting data analysis, the revision and improvement of the conceptual framework was conducted to establish a refined framework validated from the two real case studies.

4.10 Validation Process

The conceptual framework presented in Chapter 3 for VLE system implementation was validated by empirical data to establish good practice in context framework. The empirical data has to be collected from the fieldwork effectively. The key elements of the conceptual framework that was built from literature were validated from the case studies where a number of HEIs were visited to conduct interviews (Wills et al., 2009, p. 285), survey, observations and documentary analysis. For the purpose of validating the conceptual framework, communicative validation (Kvale, 1994) was used in interviews with experts and people that were directly involved in the VLE system implementation. The real experiences from participants enabled documentation of good practice to ensure that the key elements of the conceptual framework are valid. As part of the validation exercise, the following three key operations were performed on the instances of various key elements of the conceptual framework:

a) Addition of new instances to the key elements

This involved identifying such key elements that are derived from the empirical data that were not highlighted in the literature; therefore, new processes, sub-processes, CSFs, stakeholders, challenges, risks, and tools, technologies and methods were derived from the empirical research that were not identified in the literature, but which played an important role in VLE system implementation in HEIs.

b) Elimination of instances from the key elements

This involved eliminating or removing instances of various key elements not reported as good practices in the real case studies.

c) Re-positioning of instances of the key elements

This involved re-positioning instances of the key elements such as stages, processes, sub-processes, CSFs, and challenges in more appropriate locations; this refinement was conducted based on the good practices identified in the real case studies.

The refined and validated framework is presented in Chapter 6.

4.11 Validity and Reliability of Research Findings

The data triangulation process validates the research findings and results through the use of various data sources and data collection methods, thus providing a robust evidence of theory (Dube and Pare, 2003; Eisenhardt 1989). Yin (1994) stated that if the research findings or conclusions are based on several different sources of information they are most likely to be substantial and precise. There are five key types of triangulation (Denzin, 1978; Janesick, 2000): data triangulation, investigator triangulation, theory triangulation, methodological triangulation and interdisciplinary triangulation. In the context of this research, two types of triangulation are used, as shown in Table 4-8

Type of triangulation	*Description*	*How it is achieved in this study?*
Data	Achieved through the use of variety of data sources	Data is collected through various sources such as different roles, different HEIs, different settings/levels of VLE system implementation
Investigator	Achieved through the use of several different researchers or evaluators	Not applicable
Theory	Achieved through the use of multiple theoretical perspectives to interpret a single set of data	Not applicable
Methodological triangulation	Achieved through the use of multiple methods to study a single problem	Multiple data collection methods including interviews, surveys, documentary analysis, and observations
Interdisciplinary triangulation	Achieved through the investigation of issues related to more than one discipline	Not applicable

Table 4-8 Application of Data Triangulation

For this research, triangulation in data sources and data collection methods was used to study the same phenomenon, thus providing stronger validation of theory building. The data was collected from various sources such as different roles, fourteen different HEIs, different settings or levels of VLE system implementation as well as through using different data collection methods such as interviews, surveys, observation and documentary analysis. The data collected from both case studies are presented in the proposed framework, thus all data gathered from both case studies are used for the same purpose, which is the validation of the conceptual framework.

4.12 Ethical Considerations and Access

Trochim and William (2001) illustrate that ethics is one of the most important aspects in research to ensure that studies comply with legal ethical obligations and professional standards. It was also essential to ensure the confidentiality of participants' personal data or information while considering the need for collecting reliable information. Ethical approval was sought and obtained from the Brunel University Research Ethics Committee prior to conducting this research. Introductory emails were sent to participants about the aim of this research. The information sheet and consent forms were also sent to the participants via email, which were returned with signed consent.

4.13 Conclusion

This chapter explained the research methodology adopted for this research and the data analysis methods used. Considering the nature of this research, the positivist qualitative research approach was chosen as the most suitable for this thesis. Using more than one data collection method enabled covering the entire phenomenon of interest from all sides as well as to improve the quality of the research (Oates, 2006). This research involves both primary and secondary data collection methods in order to ensure reliability of the findings. Moreover, the case study research strategy has been adopted to extract meaningful information from the responses of the surveys, interviews and observations. Finally, responses from the two case studies were analysed using Nvivo and the validation process was conducted. Analysis of findings from the two case studies is presented in Chapter 5.

Chapter 5: Case Studies Analysis and Research Findings

5.1 Introduction

This chapter presents the findings from the case studies conducted for this research and mentions the key analytical tasks undertaken in the two case studies. This research aims to '*to build a good-practice-in-context framework for the implementation and use of VLE systems in Higher Education Institutions (HEIs)*'; it intends to covers two case studies covering different levels, the national and local levels. These case studies are conducted in order to validate the conceptual framework presented in Chapter 3. This chapter identifies the key stages, processes and sub-processes and critical success factors need to be considered, challenges faced and risks in the VLE system implementation. The results from the case studies are analysed following a qualitative approach and using the NVivo tool. Finally, conclusions drawn from the case studies are summarised.

5.2 Case Studies

For this thesis, two case studies were conducted to cover different levels of detail; firstly, at the national level (various UK universities); and secondly, at the local level (a London-based university). The national level case study provides an overview of the current state-of-the-art of VLE system implementation in UK universities, where as local level case study provides a rich, detailed insight into the implementation of the new VLE system focusing on usability and acceptance aspects in a local university. Both case studies were conducted to obtain an in-depth investigation during the end-to-end implementation process.

5.2.1 Case Study 1: National Level

5.2.1.1 Case Study Narrative

For the National Level Case Study, UK was chosen because it is one of the leading countries practicing e-learning (Hung, 2012); thus, providing an opportunity to investigate the good practices of VLE implementation in different UK universities. At the national level, fourteen fourteen UK universities undergoing the process of VLE implementation were investigated, to examine their current system, the date they changed their VLE system and their current implementation stage, thus emphasising the commonalities among them and providing a fresh experience for this study, which will enable validating the conceptual framework presented in Chapter 3 with a real case studies.

5.2.1.2 VLE implementation in HEIs

This section provides an insight into the overall VLE implementation in fourteen HEs across the UK. An analysis of findings from the National Level Case Study shows that some of the high ranking UK universities, in addition to the traditional face-to-face teaching, have adopted a blended learning model where with some of the modules are delivered in a fully online e-learning format. They started with a policy agreed by academic committee to align with the university mandate that every taught module must have a presence in the VLE. This highlights the importance of the strategic commitments of the entire university in order to successfully implement VLE, including setting policy for all staff to use the main VLE, and subsequently providing staff with all the required training and support with extra help of assigning an e-learning representative (or teaching administrator) in each department. There are certain considerations in terms of using e-learning according to the subject type; for example, it may be suitable for the education department to offer fully online courses, however it is not suitable for the healthcare-related courses to be fully online. An investigation into these universities highlights that although they provide a few fully online courses, blended learning is the most common model of learning in all of the universities under study.

a) Participants involved (interviewee)

The participants involved in this case study belong to different categories including decision makers, implementation team, and academic staff, as shown in Table 5-1.

Interviewees	*Involvement*	*Role*
Interviewee.1	Direct	Decision maker
Interviewee.2	Direct	Academic staff
Interviewee.3	Direct	Decision maker
Interviewee.4	Direct	Decision maker
Interviewee.5	Direct	Academic staff
Interviewee.6	Direct	Academic staff
Interviewee.7	Direct	Implementation team
Interviewee.8	Direct	Implementation team
Interviewee.9	Direct	Implementation team
Interviewee.10	Direct	Implementation team
Interviewee.11	Direct	Academic staff
Interviewee.12	Direct	Academic staff
Interviewee.13	Direct	Implementation team
Interviewee.14	Direct	Implementation team
Interviewee.15	Direct	Decision maker
Interviewee.16	Direct	Implementation team
Interviewee.17	Indirect	Academic staff
Interviewee.18	Indirect	Academic staff
Interviewee.19	Direct	Implementation team
Interviewee.20	Direct	Implementation team
Interviewee.21	Direct	Implementation team
Interviewee.22	Direct	Implementation team

Table 5-1 National Level Case Study - Participants

As shown in Table 5-1, the majority of the participants were directly involved in the VLE implementation process thus providing first-hand knowledge about their experience. Moreover, almost 63% of the participants belong to the implementation team, which consist of technical, pedagogical and training teams, as shown in Figure 5-1.

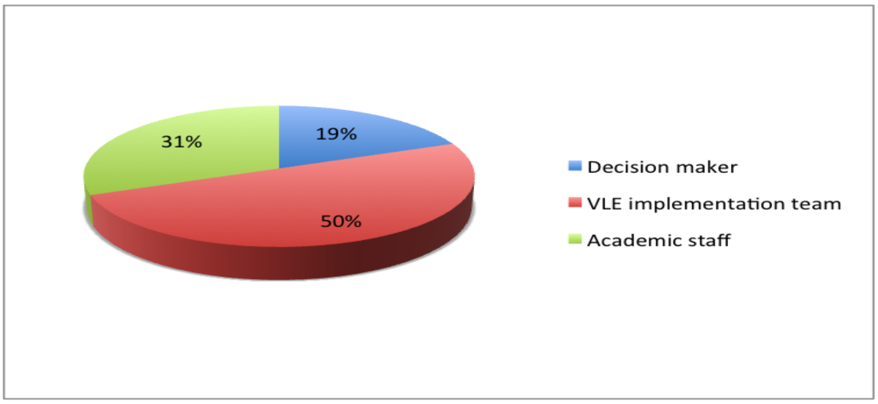

Figure 5-1 National Level Case Study Participants' Categories

It is indicated in Figure 5-1 that the responses from implementation team are most suitable to answer the research question for this study "How to build a good-practice-in-context framework for the implementation and use of e-learning systems in Higher Education?'' Also, the significant numbers of participants from the implementation team indicate the authenticity of this study.

b) Type of VLE system implemented

It has been elicited from analyses of the findings from National Level Case Study that most universities are using open source systems (i.e. eight out of fourteen), four are using commercial products, and only two universities built the VLE system in-house, as shown in Figure 5-2. The main reason for using open source is that it is free and gives more opportunities to customise; it is easily customisable.

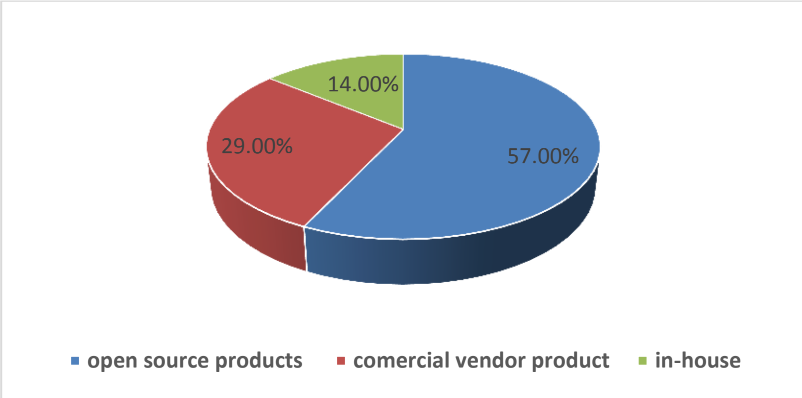

Figure 5-2 Type of VLE Systems Implemented

The findings of this research illustrate that universities have two main choices for selecting the most suitable type of VLE system: build the software in-house, or get an external vendor product (as shown in Figure 5-3). The choice is based on different variables including university's infrastructure, capability to build the system in-house, cost, and "unify all under one license" so that everybody gets the same experience and the same tools. The main advantage of building the system in-house is the flexibility for the academic staff to create their course in their own ways, thus giving staff and students as much autonomy as possible. If the university goes for an in-house option, then the academic staff in collaboration with the development team decides on the learning design and sometimes comes up with a bespoke system that fits with their model of learning. The main disadvantage of an in-house system is less consistency in terms of the student experience as different approaches will be used in designing different courses thus making it difficult for a centralised service to coordinate or organise all courses in a uniform manner. Hence, an in-house development is not widely applied, as many resources need to be allocated which include the web developers and IT equipment; also the staff's technical competency varies.

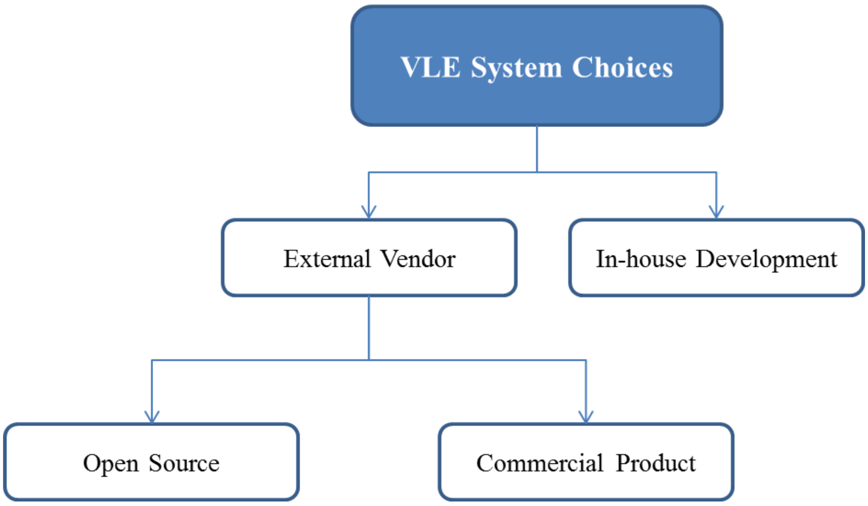

Figure 5-3 System Choices

As illustrated in Figure 5-3, once the university decides to go for an external vendor product it has two further choices: open source product (e.g. Moodle), or commercial product (e.g. Blackboard). Yet again, these choices are made based on different criteria that the university considers. Each university has it is own criteria of choosing the suitable VLE, but the most common criteria include: financial consideration, ability to customize the environment, product support, ability to modify the system, and staff's technical competency.

Noticeably all universities choosing open source products go along the route of self-hosting and/or self-management, which demonstrates that the university choices are based on their development capabilities and the ability to deal with consequences; for example, if the university does not have adequate technical resources then a more suitable choice is the commercial product, which is normally hosted and maintained by the vendor providing further support. The open sources product is more technically demanding in terms of the maintenance; however, it offers the staff more flexibility to add and integrate extra tools. Therefore, it is very important to consider the resources before taking decisions and gather a skilled team that could support the system. In case of the open source product, the software itself is developed externally by a third-party company;

however, it is designed or customised by the university's development team to fit specific requirements. The main requirement or purpose is to make the system available to every student in every course. Students should have access to the VLE right across the university for fully on-campus (face-to-face) courses, blended learning courses, and fully online courses (where the student never visits the campus). All students are expected to use the same VLE to access and support their courses. Most universities prefer open source external vendor product, as they do not have to build it from scratch while they still have the ability to customise and modify it according to their needs. Moreover, it is free, thus making it the main differentiator in terms of the cost. Findings from the National Level Case Study illustrate that cost is the main driver in making choices for the system as most VLEs offer similar features and functionalities, however they differ in the pricing and after sales support. A comparative analysis indicates that the commercial products are more expensive to buy but they save in terms of the development time; whereas open source products are quite cheaper or free to obtain but cost more in terms of the development time. It is crucial to carefully spend considering the return on long-term investment, where customisation plays a vital role and open source products provide the ability to customise; for example, academics get flexibility to create new pedagogy tools that are not available in commercial products. Hence, most universities tend to implement open source products thus allowing much flexibility for their development team and the academic staff.

c) Main drivers for changing or modifying VLE

Findings from case study of HEIs at the national level reveal that there needs to be a rationale for changing VLE and conducting a review of the requirements. These main drivers are shown in Figure 5-4.

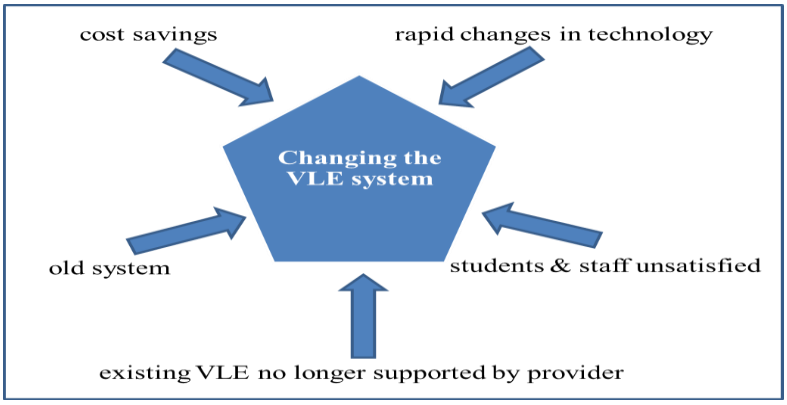

Figure 5-4 Main Drivers for Changing VLE

It can be seen from Figure 5-4 that there are five key drivers or reasons for a HE institution to change or modify their existing VLE system or implement a new system, one of which is unsatisfied students and staff. This highlights the fact that students and staff are important stakeholders of a VLE implementation, as discussed in detail in the next subsection.

d) VLE implementation stages

Since all universities considered in Case Study 1 were going through or had recently gone through the process on VLE implementation, an analysis of Case Study 1 indicates twelve key stages for the VLE implementation process, as shown in Table 5-2.

Stage label	*Stage title*
Stage-1	Analysis and Review
Stage-2	Planning and Preparation
Stage-3	Designing
Stage-4	VLE Development and Deployment
Stage-5	Formative Evaluation
Stage-6	Review and Bug Fixing
Stage-7	Integration
Stage-8	Migration
Stage-9	Staff Training
Stage-10	Final Release and Go Live
Stage-11	Continual Training and Support
Stage-12	Continual Evaluation

Table 5-2 Stages Identified in VLE Implementation

Findings illustrate that analysis and review stage is one of the most crucial stages in the VLE implementation; it is also considered as the longest stage. Moreover, the duration of Stage-1 is minimum one year. Each stage has specific processes and CSFs that are presented as part of the proposed VLE implementation framework in Chapter 6. This framework is validated with the conceptual framework built out of the literature review analysis. Figure 5-5 shows the VLE implementation stages that all universities participating in this research are currently undergoing; thus indicating that the participating universities are currently going through VLE system implementation.

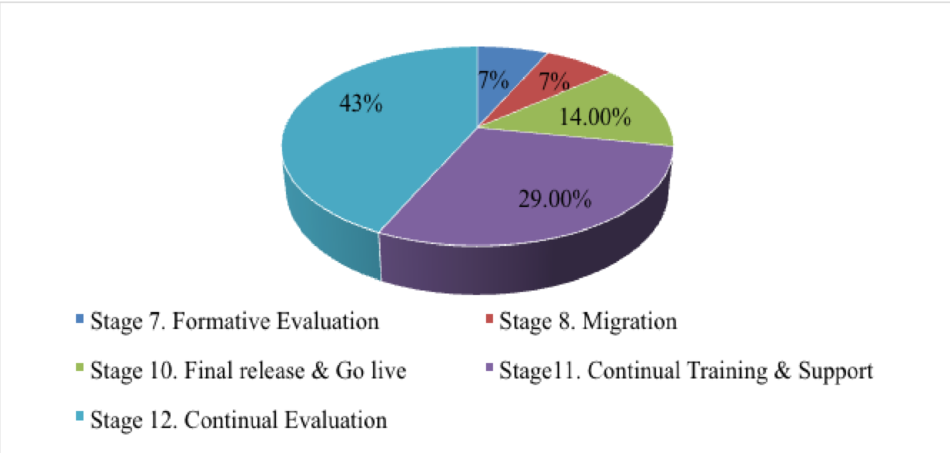

Figure 5-5 Current Status of VLE Implementation in the HEIs Investigated

Figure 5-5 indicates that all HEIs that were investigated for the National Level Case Study are conducting VLE implementation, with 43% in Stage-12 (Continual Evaluation), which truly indicates good practices and offers an insight about what worked well and the lessons learnt; 29% are in Stage-11 (Continual Training and Support), which is also considered as one of the final stages. Since VLE is considered, in most institutions, as the norm of e-learning provision, they tend to invest significant amounts of money and time in order to implement it successfully. Moreover, enormous resources are allocated for the VLE implementation. Therefore, investigating the good practices of VLE implementation in HEIs is one of the main focuses of this case study. Table 5-3 shows stages of the VLE implementation that all universities participating in this study underwent; these stages have significant value and importance as reported in case study findings, thus providing more validity to the proposed framework. The stages are categorised as high, medium and low.

An analysis of findings from The National Level Case Study shows that the most important stage in the entire VLE implementation process is Stage-2 (Planning and Preparation), where all respondents rated the level of importance as high (as shown in Table 5-3). The reason for such high level of importance is the significant impact it makes on other stages. If the planning and preparation is performed well then it facilitates smooth continuation of other stages. Moreover, 85% of the respondents rated Stage-1 (Analysis and Review) as highly important, since there are several crucial analyses conducted at this stage which significantly influence the decision making process and hence the VLE implementation; these include end-user analysis, institutional analysis and sector analysis.

Stages	*Level of importance*		
	High	*Medium*	*Low*
Stage-1 analysis and review	85%	15%	0%
Stage-2 Planning and Preparation	100%	0%	0%
Stage-3 Design	55%	40%	5%
Stage-4 VLE Development and Deployment	55%	30%	15%
Stage-5 Formative Evaluation	70%	20%	10%
Stage-6 Review and Bug Fixing	70%	30%	0%
Stage-7 Integration	80%	20%	0%
Stage-8 Migration	75%	25%	0%
Stage-9 Staff Training	70%	20%	10%
Stage-10 Final Release and Go Live	80%	20%	0%
Stage-11 Continual Training and Support	82%	10%	8%
Stage-12 Continual Evaluation	75%	20%	5%

Table 5-3 Level of Importance for Each Stage of the VLE Implementation

These stages are explained and mapped with associated process, CSFs and challenges in detail in Chapter 6. The ratings presented in Table 5-3 could be considered as an endorsement and to justify these stages in the proposed framework in Chapter 6.

e) Key elements of a VLE implementation stage

The key elements of the VLE implementation stage include various processes followed; stakeholders involved; critical success factors considered; and challenges faced. These key elements are described in detail in the following sub-sections.

i. Processes Followed

Each of the VLE implementation stages contains processes and sub-processes that are followed in line with the institution’s strategy or aim. An analysis of findings from the National Level Case Study reveals that there are certain processes, which are significant within each of the VLE implementation stages. A mapping of such processes and sub-processes to the stages is presented in Table 5-4. A complete list of all the processes and sub-processes identified from the case studies are presented in Appendix E; the refined mapping of the process with the corresponding stages is presented in the framework in Chapter 6.

Important process and sub-processes	*Corresponding stages*
P.1 Define and prioritize requirement	Stage-1 Analysis and Review
P.2 Analysis and evaluation of potential solutions	Stage-1 Analysis and Review
P.3 Involve related stakeholders	Stage-1 Analysis and review Stage-2 Planning and preparation Stage-10 Final release and go live
P.4 Make choices or decisions based on the analysis results and propose reports	Stage-1 Analysis and review
P.5 Set a time line	Stage-2 Planning and preparation
P.6 Course design and content development	Stage-3 Design
P.7 VLE hosting	Stage-4 VLE development and deployment
P.8 Run a pilot study or test period	Stage-5 Formative evaluation
P.9 Develop feedback mechanism	Stage-5 Formative evaluation
P.10 Resolve reported issues	Stage-6 Review and bug fixing
P.16 Migration of modules and course materials	Stage-8 Migration
P.11 Conduct training sessions	Stage-9 Staff training Stage-11 Continue training and support
P.12 Provide different supporting resources	Stage-9 Staff Training
P.13 Communicate and inform all the stakeholders in the university	Stage-10 Final release and go live
P.14 Launch the VLE	Stage-10 Final release and go live

Table 5-4 Key Processes in VLE Implementation

It can be clearly seen from Table 5-4 that the process P.3 “Involve related stakeholders”, takes place in three different stages of the VLE implementation thus demonstrating the importance of consulting stakeholders at various stages.

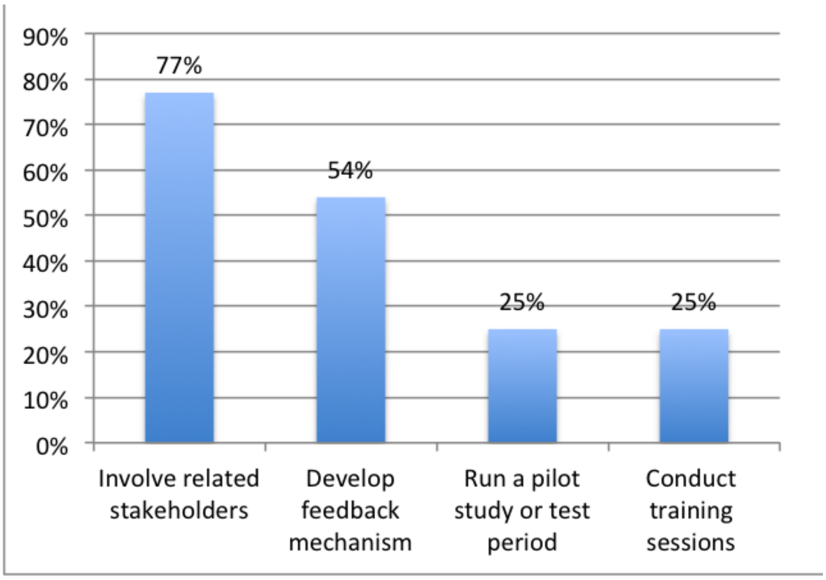

Figure 5-6 Key Processes in VLE Implementation

Figure 5-6 shows that 77% of the participants mentioned that process P.3 Involve related stakeholders is the most important process in VLE implementation, 54% reported process P.5 Develop feedback mechanism, 25% reported process P4. Run a pilot study or test period, and 25% reported process P.11 Conduct training sessions as the most important processes. Each participant could mention more than one process.

ii. Stakeholders involved

An analysis of findings from the National Level Case Study illustrates that stakeholders are a key element of the VLE implementation. It has been identified as a good practice to involve stakeholders in very early stages of the VLE implementation; consultation and negotiations with all parties are very crucial. Also, generating feedback from students and staff as stakeholders enables designers to improve the system, which is also very important. Moreover, the staff perspective explicitly highlighted the importance of involving the end-user from the first stage which will help to implement VLE in the institution successfully taking into consideration their needs and expectations; it also helped the institution to decide which system was more suitable to their needs. In particular, academic staff should be involved in the decision making process for the selection of a suitable VLE. Findings reveal that for a successful VLE implementation it is imperative to involve relevant stakeholders at each stage. The involvement of various stakeholders in the VLE implementation occurs at different stages.

HEIs have involved various stakeholders at each stage of the VLE implementation. Getting buy-in from users is quite important because no matter how great or economical the software is, it cannot ensure acceptance unless the users of the VLE system are involved in the change or decision-making process. The users need to be communicated well at the time of implementation in terms of asking questions about their expectations, getting their feedbacks, and enabling them to follow progress updates thus providing the users some confidence about their involvement in the VLE implementation process. The e-learning specialists are the key advocates of e-learning within the university. The e-learning technologists provide pedagogical advices, guidance, encouragement and support on the use of technology to staff involved in teaching; the technical team is responsible for the technical issues; the pedagogical team consists of teaching experts. Decision making is an important process that usually follows the analysis and review stage, the key stakeholders involved in this process includes: top management, academic development unit, academic staff, e-learning specialists and strategic unit. Findings illustrate that one of the good practices is to engage the academic staff in the decision making process to assess whether a VLE system is required or some other e-learning technology could serve their need. Such judgement can be made by conducting an extensive analysis or review. Good practices include also involving the academic staff in gathering the requirements for the VLE, as well as involving them in the course design for consultation, and in pilot groups to test the system. Moreover, making them aware and engaged in different stages of the VLE implementation give them the opportunity for suggesting new features they need which could be added in a VLE. Such meetings are conducted three or four times a year where discussions between the academic staff and the VLE implementation (development) team takes place for improvements; it is kind of a formative evaluation and consultation exercise with the academic staff where changes are made accordingly. The majority of academic staff members are engaged in the training stages (Stage-8 and Stage-11), where they are trained in using the new VLE system. Appendix F shows the list of various stakeholders involved in the entire VLE system implementation derived from the case studies, where the students, the academic staff, and the top management have been reported as the key stakeholders as shown in Figure 5-7. Since stakeholders are involved in different stages of a VLE system implementation, therefore a refined mapping of the stakeholders involved in each stage of the VLE system implementation is presented in Appendix K, which is used in the proposed framework (presented in Chapter 6).

An analysis of the findings from the National Level Case Study for HEIs reveals that academic staff members are one of the most important stakeholders of a VLE implementation since they have a direct responsibility for applying various teaching methods or pedagogical practices to disseminate knowledge, and hence are considered as the main stakeholders of any e-learning development. In universities, the academic staff are individual centres of productivity, they produce courses and deliver a course in their own preferred way; moreover, one academic will not work in the same way as the other academic so the universities consider academic staff as most important because through their reaction the effectiveness of a VLE system can be measured and monitored during a course and problems could be diagnosed or identified.

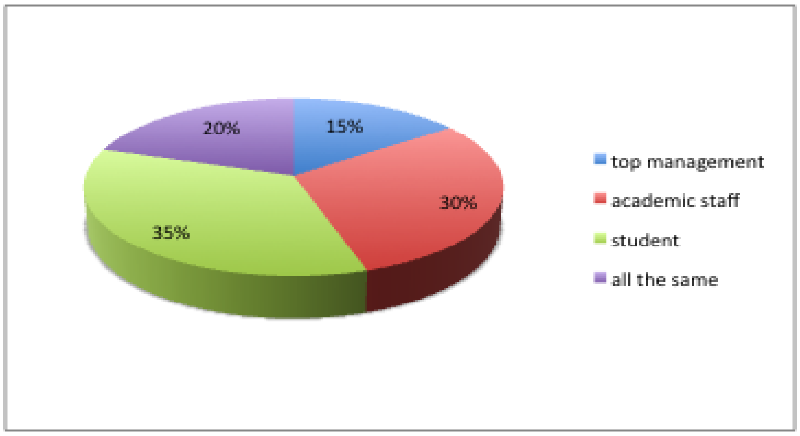

Figure 5-7 Most Important Stakeholders of VLE Implementation

Another key stakeholder is the student. Findings illustrate that out of twenty-two interviewees 35% mentioned that students are the most important stakeholders, whereas 30% mentioned that the academic staff are most important, 15% mentioned top management, and 20% mentioned all the same. Therefore the majority are considering the student as the most important stakeholder. Since students are at the core or focus of the learning process; it is imperative to consider students' requirements from a VLE system and while providing a VLE system to the students, it should be considered that the primary goal is helping the students to learn. So in order to benefit students, it becomes necessary to support the academic staff with the right equipment in the right time. This could be achieved by implementing the learning design inside the VLE, also it should enable students to interact with each other and with the academic staff to be able to perform activities that relate to various resources available on a VLE system. Therefore, providing adequate support and training to students is mandatory. Students get support from the IT help desk, academic staff, student centres, or the learning technologist. Since students have diffident choices, building a complete learning process for life by personalised learning requires more flexibility and freedom, thus offering them different possibilities to learn. Moreover, students' access to information and learning resources is very crucial in their learning process, which required suitable training materials, guidelines or instructions of using a VLE system. Also, the academic staff members need to meet their expectations - if the students ask to use the technology and the staff do not respond, that will affect the performance reports on the latter, and undermine student satisfaction.

There are various channels through which the academic staff and students are engaged - for example, to meet them in student forums with student reps, thus allowing discussion and delivery of feedbacks/ also the HEI conducted some focus groups with the students to investigate what they like about the new VLE system and what issues they are having. Such feedback is incorporated during the review process in the usability testing, which is quite useful in terms of helping the university to determine which system to implement in future based on the already generated feedback from students. It has been indicated in the findings from the National Level Case Study that one of the good practices is to test the system for its ease of use with student-users; on this point, it was observed that one month before the system went live, the HEI provided students with an opportunity to engage in the implementation process where a testing course was set-up and for them; they could login and provide their feedbacks. It was loop testing for the system, but also students were logging into the course, so they were giving feedback through that course as well.

It is quite clear that if the e-learning system (VLE) in the institution is not advanced enough to meet the academic staff's or students' needs, the effectiveness of the learning process will be very limited; therefore it is crucial to gather the requirement from the staff and students. Student and staff satisfaction is one of the key drivers of changing or upgrading a VLE system, as illustrated in Figure 5-4. A VLE needs to meet both staff and students' expectations in order to successfully engage technology enhanced learning into the pedagogical practices.

iii. Critical Success Factors CSFs considered

Each of the VLE implementation stages relate to some specific CSFs that need to be considered in order to achieve a successful VLE implementation in HEIs. In a sense, these factors are a guidelines and considerations. Findings from this research identify various CSFs for VLE implementation (as presented in Appendix G), where the ten most significant factors reported are:

- CSF- Top management support
- CSF- Involve the stakeholders in different stages of the VLE implementation process
- CSF- Communication between different stakeholders
- CSF- Enhance user experience
- CSF- Functionality and accessibility of the system
- CSF- Ease of use
- CSF- Training and support
- CSF- Preparing staff and student for the change
- CSF- Provide different supporting resources
- CSF- Identify stakeholders

An analysis of the findings from the National Level Case Study indicates that the HEIs consider highly these factors for a successful VLE implementation. Since various CSFs need to be considered in different stages and processes of a VLE system implementation, therefore a refined mapping of the CSFs corresponding to each stage and process is presented in Appendix J, where each CSFs is linked to a specific stage of the proposed VLE system implementation framework (presented in Chapter 6).

iv. Challenges Faced

An analysis of the findings from the National Level Case Study shows that there are several difficulties or challenges faced throughout the entire VLE implementation process. A comprehensive list of such challenges is presented in

Appendix H. Since these challenges occur in different stages of a VLE system implementation, therefore a refined mapping of the challenges faced corresponding to each stage of the VLE system implementation is presented in Appendix L, where each challenge is linked to a specific stage of the proposed framework (that is presented in Chapter 6). The top five challenges of VLE implementation identified from the analysis of the findings from the National Level Case Study are mentioned in detail as follows:

CLG-1: Lack of usability

A key challenge identified in the National Level Case Study is the lack of usability; one reason could be because the system is not easy to use or is not user-friendly. It is extremely important to make the system easy to use, which will help the academic staff apply technology in different pedagogical practices. Otherwise, the academic staff will need more technical support and assistance even if they are familiarized with using this type of technology outside the university system. If academic staff faces difficulties, they will not be encouraged to apply technology to improve their teaching practices. For this purpose, the interface design could be made easy to use, e.g. with one-click approach. Moreover, providing on-demand and quick support is crucial to overcome these difficulties especially in the case of the academic staff. Support could be provided via various resources, for instance e-learning advisors providing immediate support by attending personally to help, by phone calls and talking through the problem, by an email advising how to resolve any issues very quickly; normally, it should not take more than a few hours to resolve any issues.

CLG-2: Resistance or lack of acceptance

Once the system is successfully in place and available for everyone to use the main challenge faced is the resistance from staff. Getting the buy-in from the users of the VLE system and involving them in the change or decision-making process is quite important in order to ensure acceptance. Furthermore, the main reason for resistance is the lack of skills required as well as a lack of awareness of the technologies available and how to use them. Therefore, this thesis highlights the importance of establishing digital literacy as part of the Technology Enhanced Learning (TEL) strategy, which will help in generating awareness in staff and students. Academic staff does not use a lot of functionalities available on the VLE system due to lack of awareness or technical competency; this challenge can be overcome by applying a good digital literacy as part of the institution TEL strategy. Moreover, findings show that the first impression for the VLE system significantly affects the acceptance from users; therefore, it is imperative to have a user-friendly system, which is intuitive, easy to use, customizable, and easy to configure. The VLE system is more likely to be accepted if it demonstrates a significant improvement from what was using before and it looks better depending on the colour scheme or style of skins. An analysis of the findings from the National Level Case Study reveals that 80% of the universities experience resistance from either staff or students or both, and the key reasons for that are:

- Uncomfortable towards technology in general, and less aware of it
- People had bad experiences where things went wrong and they lost work
- Scared of change
- Not being involved
- Change will be learning curve requiring time and effort

Findings show that the institutions that focus on digital literacy and training have overcome the resistance among the staff. Therefore, a strong impact of digital literacy has been witnessed on addressing staff resistance. Moreover, departments or schools with less technical competency and less confidence in using technology are experiencing more staff resistance.

CLG-3: Poor user experience

There are annual cycles of adapting and creating new instantiations of the system in each academic year. Some evaluation systems are in place that look at student and staff experiences at the end of each academic year, and based on the responses the VLE system is revised, updated, improved, or enhanced for the next academic year, hence there is an annual cycle. Thus, if a certain tool is introduced or set-up, it is important to feel confident about the personal learning experience, and there is a big gap between people learning experiences and naturally what technology delivers at the moment. Therefore, enhancing user experience with the actual technology is always a challenge. However, user experience according to the standard ISO 9241-210 is defined as “a person’s perceptions and responses that result from the use or anticipated use of a product, system or service” (ISO, 2010, Section 2.15). A common assumption in e-learning is that usefulness and ease of use result in more positive attitudes of students toward e-learning, thus improving learning experience and satisfaction (Santos et al., 2014). In any case, users are also to be involved in evaluating the user experience (Santos et al., 2014).

CLG-4: Lack of engagement

Another challenge identified in the National Level Case Study is engaging academic staff and students to use the technology themselves, because if the staff and students are not engaged, they will not use the system and thus the VLE implementation will not be a success. Hence, it is a challenge to make staff and students engage with the system; however, this challenge can be overcome by applying a good user engagement strategy. An analysis of the findings from the National Level Case Study shows that some HEIs have established an end-user engagement strategy, which is part of their TEL strategy

CLG-5: Awareness of the VLE system and how to use it correctly

Awareness around the existing technologies, inductions with the technologies, and familiarity with all the fondness of the technology are other challenges identified through the National Level Case Study in HEIs. This involves driving up awareness and making sure that people are attending the training sessions Moreover, it is imperative to generate awareness around the VLE system and getting people to use it correctly - thus making sure that both staff and students are familiar with the system and have used the technology before.

Besides these challenges, having the right people in the project team and obtaining top management buy-in or support are crucial steps to take during a VLE implementation. Moreover, meeting students' expectations is among other biggest challenges that are currently faced by the HEIs because students have different choices and preferences.

f) Key resources required for VLE implementation

Findings from the case studies highlight several resources that are required for a VLE implementation; the most crucial resources include time, top management support with budget, and human resources.

i. Time needed

It has been reported from the National Level Case Study that none of the universities actually claim to have a fully implemented VLE; most of them are still not set to be used by all staff. However, it has been reported that the actual time allocated for the VLE implementation is on average between two to three years. Table 5-5 shows the duration of the VLE implementation process for each of the universities investigated. Most time is taken in gathering requirements from staff and students and in evaluating the products or potential solutions against those requirements, which is part of the analysis and review Stage-1 (as mentioned in Table 5-2); eventually decisions are made based on the results of the analysis. This stage is very important and findings illustrate that this is the longest stage in the VLE implementation, which can take from 1 to 2 years before the HEI actually selects the system they want to go with. Further details on this are provided in Chapter 6.

HEIS	*Duration of implementation*
UNI. 1	2 years
UNI.2	3 year
UNI. 3	2 years
UNI.4	2 years
UNI.5	2 years
UNI.6	3 years
UNI.7	3 years
UNI.8	3 years
UNI.9	3 years
UNI.10	2 years
UNI.11	2 years
UNI. 12	2 years
UNI.13	18 months
UNI.14	3 years

Table 5-5 Duration of the VLE Implementation Process

After the decision is made, the project takes up to two years; where the first year is getting the system in place, and the second year is mainly looking for changing behaviour in terms of adaptability and usability.

ii. High level of management support

An analysis of findings shows that high-level top management support is needed to implement the VLE system across the university; this high-level support from the top management is required because of the financial backing, credibility and fundamental support and is an essential factor in VLE implementation. It is imperative to have support for the additional budget required, because sometimes consultancy services are required from vendors or a third party to get knowledge and experience for the new system. Such support could be provided by a person or group of persons on senior position in learning and education in the university including advisory board, project board, and steering board which is like a pedagogical and academic board. Also, support from head of schools and strategic education committee could be beneficial because VLE implementation needs significant buy-in.

iii. Human resources required

It has been elicited from the analysis of findings for the National Level Case Study that the number of implementation team staff is on average five to six people for commercial products and six to nine people for open source products. In addition, VLE implementation requires supporting body, additional human resources for training, IT support, networking team, information system team to put the system in place, and programming support. Examples of supporting bodies as reported in the case study findings include: the Higher Education Funding Council for England (HEFCE), JISC, commercial vendor product provider, and other universities with experience of VLE implementation that may work as a supporting body to other universities. They work as consultants and provide support during the implementation process; also they provide advice in using digital technology for education purposes.

g) Existing frameworks or models for the VLE implementation

In order to implement a VLE, the university need to consider a framework or model; this ensures an essential supporting structure of project thus making the implementation successful. The implementation of VLE usually covers two aspects: the technical and the pedagogical. An analysis of findings from the National Level Case Study identifies that most of the HEIs are using PRINCE2 (Doherty, 2010) for project management in terms of planning and management; however, the project planning is conducted in a casual manner. Some HEIs hire consultancy services from the VLE system provider (e.g. vendor company) and they have some in-house developed models for VLE implementation, which are evolved from the vendor's worldwide experience, so the HEIs follow their approach and guidelines. Other HEIs use a set of certain considerations and certain dimensions for TEL strategy to tick certain boxes about employability, about linking teaching to the research, about innovation, about assessment and feedback. The majority of the universities seem to have their own process, which they develop themselves and follow; this is especially the case with big universities that have a lot of experience and knowledge. Another model highlighted from the case study findings is ADDIE, for system deployment (Mayfield, 2011). Other general systems for software development life cycle employ unified process (Kruchten, 2004) or spiral prototyping model (Boehm, 1988).

h) Limitations of the existing alternatives to a VLE framework

PRINCE2 has been reported as a common project management system, which is not even a VLE implementation framework or model. The biggest limitation of PRINCE2 is that it is a project methodology, and it is not specifically designed for implementing an e-learning environment. This is because the culture of universities does not favour the strict employment of project management tools, which could potentially cause conflict and resistance (Doherty, 2010). VLE implementation is not a trivial task; it requires significant effort in terms of considering the various aspects, as mentions in the earlier sections, which are crucial to its success. These include VLE implementation stages, processes, stakeholders, challenges, resources, and risks. However, there is no such framework that is comprehensive enough covering all these together, which highlights the importance of this research, as the proposed framework intends to cover all crucial aspects of the VLE implementation process.

Hence, an analysis of findings from the National Level Case Study illustrates that the HEIs do not follow a specific VLE implementation framework, but rather bespoke frameworks are most common practice. It is significant to mention that no such model or framework has been reported in the case study findings. This highlights the importance and contribution of this research to the body of knowledge.

i) Risks involved in VLE implementation

An analysis of findings from Case Study 1 shows that the HEIs deploy risk analysis in a business case before the decision is made regarding the VLE implementation. Risk analysis is conducted in Stage-2 (the planning and preparation stage), where a risk register is maintained and updated regularly by the project team to identify risks (technical and human risks) for the entire project. Moreover, solutions for each risk are identified as a part of the project planning starting with highlighting various risks in the project initiation documents. The risk analysis should be an on-going process throughout the entire VLE system implementation project. It has been identified as a good practice to allocate approximately two or three weeks for risk mitigation, which is if something goes wrong then there is enough time to fix it, but careful consideration needs to be given to placing such mitigation period in the project. Findings show that several risks are associated with VLE implementation, as shown in Table 5-6.

Nos.	*Key risks involved in VLE implementation*
Risk-1	Poor infrastructure (e.g. VLE is unreliable and slow)
Risk-2	Risk associated with picking the wrong solution (system fail, waste money and time)
Risk-3	System related risk, technical risk
Risk-4	Lack of accessibility
Risk-5	Risk related to data loss (e.g. if server goes down)
Risk-6	Lack of financial support
Risk-7	Integration risk (new VLE not fit with other systems in the HEI)
Risk-8	Failure to gather accurate requirements
Risk-9	Employee retention risks
Risk-10	Lack of timely support
Risk-11	Copyright issue with the visual and audio material in VLE
Risk-12	Time management
Risk-13	Service downtime
Risk-14	Unbalanced used of technology and unsustainability of courses
Risk-15	Negative use of technology (e.g. students get saturated with media)

Table 5-6 Key Risks Involved in VLE Implementation

These risks mentioned in Table 5-6 are prioritised in accordance to the frequency with which they are mentioned in the data analysis; it is clearly indicated that the main risk is poor infrastructure - for example, VLE can be unreliable and slow which lead to low usability, user lack of acceptance, and lack of staff engagement. User engagement is part of user experience. An analysis of findings from Case Study 1 clearly indicates that the main concern for universities in having a successful VLE implementation is the lack of user engagement, which has an impact relation with the usability and user experience. Usability can be understood in terms of efficiency, effectiveness and satisfaction. The usability and adaptability aspects are further investigated in Case Study 2, which was conducted at a local university. This research also contributes to the TEL strategy in terms of enhancing user engagement.

j) Alignment of VLE with the TEL strategy

An analysis of findings from Case Study 1 on HEIs (national level) reveals a clear coherent intervention between the VLE implementation and the TEL strategy: the implementation of the former is one of the key elements of the latter. Moreover, the choices made in the VLE implementation have to be in-line with the institution's TEL strategy. The first thing the HEIs start with is building a strategy as a framework then moving on to who the main stakeholders are and what their influence on the success of the system is, and then into what their priorities are, which lead them to a VLE implementation. The key long-term goals of an enterprise are translated into a strategy along with the sequences of action and adequate resources assigned to achieve such goals (Chandler, 1962). TEL strategy is a culture where a vigorous technology environment is provided to a wide range of learners enabling effective learning opportunities independent of the location (JISC, 2010). An analysis of the findings from this research illustrates that an institution's TEL strategy mainly ensures that appropriate structures and systems are in place to effectively facilitate the develop TEL across the institution. Once the implementation plan is prepared and signed-off, the next strategic plan is to address the development of learning opportunities - eventually enhancing student and staff experiences and enabling the institution to achieve a sustainable future. Figure 5-8 illustrates some critical success factors that need to be considered while designing an institution's TEL strategy, as elicited from the Case Study 1 findings.

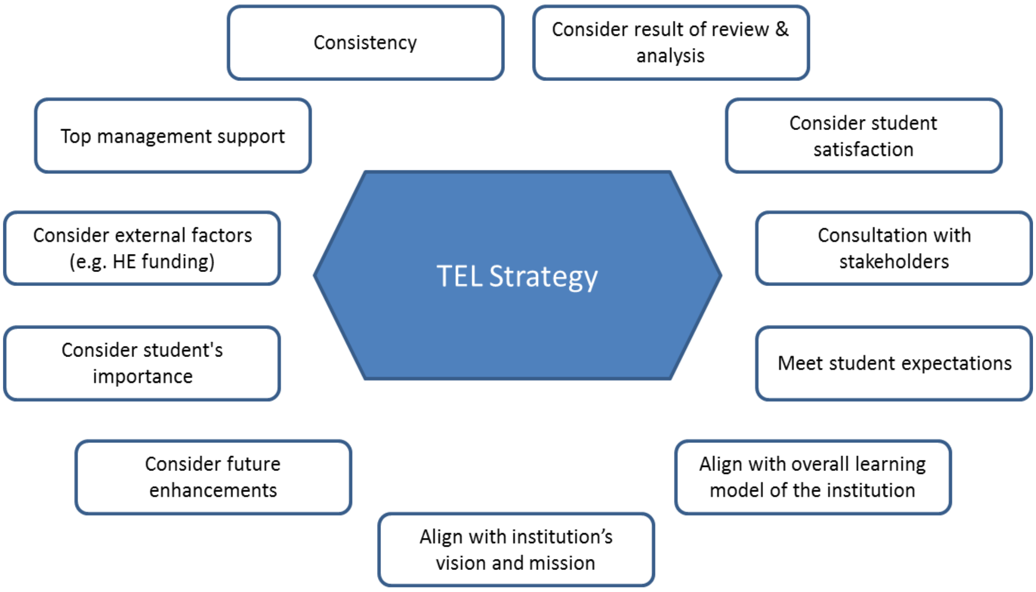

Figure 5-8 Critical Success Factors Considered for Designing TEL Strategy

It has been revealed in the findings that sustainability and cultural change are the main challenges in a TEL strategy; this could be translated into user experience in terms of usability and adaptability aspects of the VLE systems, which are investigated in detail in Case Study 2. Several institutions have invested in the expansion of the e-learning support team to enable a well thought out and pro-active approach to e-learning developments across the institution. The e-learning advisors work in coordination with the departments to implement actions that are documented in an institution's TEL strategy. There are eleven building blocks of the TEL strategy that are highlighted from the analysis of findings. Figure 5-9 presents these building blocks or main elements of the TEL strategy as elicited from the data, which are explained in the following sub-sections.

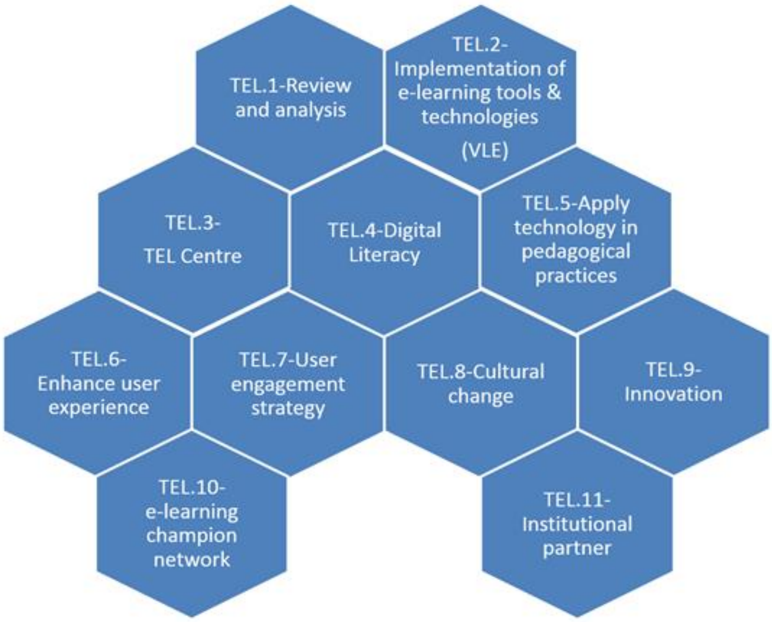

Figure 5-9 Building Blocks of TEL Strategy

TEL.1- Review and analysis

Findings reveal that a key element of the TEL strategy is to conduct a review and analysis of the current status in the institution and to setup a strategy based on that analysis. It is clear that the implementation of TEL is a long-term process, which needs to be structured in an appropriate manner from the start, involving suitable and qualified people and having a clear strategy. Most institutions consider conducting review and analysis at the beginning as a good practice; this review helps and leads the institution to narrative and discourse about what a technology enhance learning in the institution should look like. The key requirements of TEL.1 are to have a clear strategy and to involve suitable and qualified people, as mentioned in Appendix I.

TEL.2- Implementation of e-learning tools and technologies

It is clearly indicated in the findings from Case Study 1 that an important element of TEL strategy is to consider multiple e-learning technology possibilities that an HEI could implement - for example, VLE, Massive Open Online Course

(MOOCs), or Personal Learning Environment (PLE). VLE is the mainstream form of an e-learning technology in which the universities are investing a lot of money and effort to implement. Even though, several HEIs offer e-learning via VLE systems, the use of VLE is still at a very basic level, which is mainly for the delivery of electronic documents to the students. Therefore, this research mainly focuses on the good practice of VLE implementation in HEIs.

Findings from this research illustrate a coherent intervention between TEL strategy and VLE implementation. The HEIs examined in this research made their choices of e-learning tools and technologies according to the end-user needs, ending up mainly with a choice of a VLE system. The TEL strategy gets aligned to the learning overall model (blended learning or pure online), whichever the institution intends to implement. Majority of the universities prefer blended learning, which is using technology to support student while they learn in different ways. This is based on the key requirements of TEL.2, which are to align the TEL strategy to the learning overall model and consider end-user needs, as mentioned in Appendix I.

TEL.3- TEL Centre

An important element of the TEL strategy is the establishment of a TEL centre, which is responsible for all TEL-related activities within the institution, including how the institution intends to apply the TEL strategy. It consists of a technology-enhanced learning forum, which is a team of experts on how e-learning should looks like in a big HEIs. They conduct series of meetings aimed to change the learning landscape in the institution, discussing what the possibilities in teaching and learning are, and putting together a working group to consider what learning will be like in the future in the institution. This centre can be considered as an umbrella of different activities and units related to TEL in the HEI.

An analysis of findings from the National Level Case Study indicates that, in November 2013, one of the HEIs established an Educational Excellence Centre (similar to the TEL centre). Moreover, an important CSF of the TEL centre is to involve faculty-learning technologists that are representatives from each faculty in the HEI. These constitute the group setting up and administering the VLE system implementation; the people who actually go and implement courses and build courses are learning technologists from the teaching faculty or the academic staff. They are the links between their faculty and the e-learning environment team. Learning Technologists support their faculty staff in terms of always staying up-to-date with everything related to e-learning in the institution. It has been highlighted from the findings of Case Study 1 that an important CSF for the TEL centre is to involve the faculty quality enhancement group in TEL Centre; this group's role is to enhance the quality of faculty through providing help in regulating the University-wide monitoring mechanisms in respect to learning and teaching quality enhancement and assurance. Furthermore, findings also indicate the importance of involving learning technologists in the VLE review steering group. This group constitutes primarily of the learning technologists but are based in the faculties representing their academics on the VLE review steering group. Part of the steering group's duties are thinking and advising the institution about what to adopt. Faculty learning technologists are involved in the decision-making process to provide their feedback, and they are heavily involved in all stages in the entire implementation process. Some requirements for the TEL centre are presented in Appendix I.

TEL.4- Digital literacy

Digital literacy is another element of the TEL strategy. It is the ability to effectively and critically navigate, evaluate, and create information using a range of digital technologies (Eshet, 2004). Educating the staff and the students and fostering their understanding about using the new technology will help in enhancing efficiency and effective use of the system eventually leading to an increased student satisfaction. It can be achieved when the institution considers some of the digital literacy activity for the staff and the students. Findings from our research reveal that the HEIs need to educate staff and students on how to use technology effectively, making sure that both staff and students get familiarised with the best use of the VLE system. In some universities, the e-learning team is providing the digital literacy training to teaching administrators only, so that they can provide better support to the academic staff. In order to enable digital literacies eight key requirements have been highlighted in the findings from Case Study 1, which are listed in Appendix I. The most important requirement is picking such academic staff members that are quite enthusiastic about technology, so that they can try the VLE system themselves at various levels and demonstrate to their colleagues that technology works in their situation.

TEL.5- Apply technology in pedagogical practices

It is one of the most important key elements of the TEL strategy to incorporate good practice, where the focus has moved from contents to activities. It always boils down to what the academic staff members are actually doing with the e-learning system; it is they who actually create the learning environment and are the main driver for an effective use of the VLE system. It is their responsibility to find the most suitable technology for applying a specific pedagogy and being innovative in using this technology. Findings from the National Level Case Study illustrate that developing a website to indicate best practice and teaching achievements promotes the sharing of various resources and teaching and learning tools across the institution; it is an effective way to spread the best practices, and also helps to encourage the rest of the staff to do the same will help to exchange experiences to identify best practices.

An analysis of findings from the national level HEIs indicates eleven requirements for applying technology in the pedagogical practices, as shown in Appendix I. Sharing experiences could be internally within the institution or externally with other academics from different institutions. Sharing experiences can be through participating in academic community blogs or website and has encouraged staff to apply technology within their different pedagogical practices. Findings from Case Study 2 show some challenges faced by the academic staff in applying technology in the pedagogical practices, as shown in Appendix H. Demonstrating best practices within the institution will help in applying technology in pedagogical practices (e.g. providing more interactions); this can be done in every department separately as different subjects have different e-learning needs. Demonstrations of a good practice where some academic staff members make presentations within their departments explaining to their colleagues how the technology works for their situation and what benefits they can gain from applying and adopting technology within the VLE system in their pedagogical practices are quite significant in terms of enhancing the usage of the VLE system.

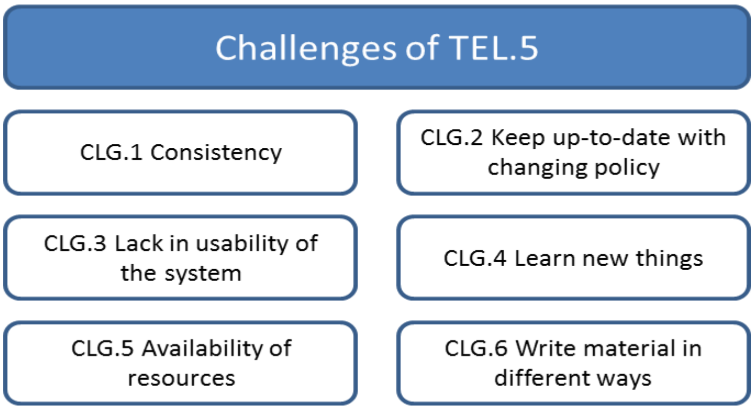

Figure 5-10 Challenges of TEL.5

Local staff members are more likely to understand their specific needs. Telling them about how they saved time, how all students enjoyed doing it, or how it is making their lives easier. It is just for the academic staff to be aware of what options and flexibility in teaching and learning design are available to them via the VLE system; hence it is about spreading good practice or about motivating people to follow it.

TEL.6- Enhance user experience

An analysis of findings from Case Study 1 reveal that embedding TEL in learning and teaching strategy is one of the good practices to enhance user experience. HEIs use technology to enhance the student experience by creating a community of users including academic staff and students. Findings show that the staff experience lies in the heart of student experience; some requirements for enhancing user experience are as shown in Appendix I.

TEL.7- User engagement strategy

The key part of the TEL strategy is stakeholder involvement in gathering the requirements for the VLE. Findings from Case Study 1 illustrate that an important element of the TEL strategy is the user engagement strategy. User engagement is a CSF for the success of the system, therefore the institution has to consider an end-user engagement strategy and bring everybody on board. Having a strategy of induction of the staff and student to the ICT of the system is very crucial. The university has to start with a survey to raise the staff's level of engagement in using the e-learning technology (VLE), and then to give them help and support to move them to the next stage with some reward and incentives to motivate them to be engaged. It has been indicated that looking for ways to ensure keep going drives up the user engagement. Findings indicate that the way VLEs are used at the moment is just as a repository, as just a place to hold the information, and it is not used in a proper pedagogical way; so the reality is that to improve students' engagement, more time has to be spend by the lecturers on thinking out and planning how to make technology interventions within the students' normal pattern of work. Findings show that academic staff should drive and encourage online activities as student engagement is heavily depended on the academics' use and drive. Adoption of a user engagement strategy by the institution could raise the bar to increase the standard at which the academic staff members provide more variety by using the technology effectively. It has been reported as a good practice that most HEIs ensure that all staff members are engaging with the VLE system at the basic or advanced levels; an example of the basic level use is posting lectures slides in VLE, and that of an advance level use is for exploiting audio feedback, and lecture recording. The key challenges for TEL.7 are lack of awareness in academic staff and students; moreover, academic staff's time is very limited. Some requirements of TEL.7 are mentioned in Appendix I.

TEL.8- Cultural change

Changing institutional culture is another important element of the TEL strategy. It is carrying out that change in behaviour so people are willing to innovate more with the e-learning system. Some staff members may not be IT literate, and they may resist TEL because they are scared of change. It is important to ensure using the most comfortable way to bring them all on board, so that they start using the system. An analysis of findings from the national level HE institutions illustrates that more emphasis is being given to recognising and rewarding good teaching practices. Moreover, a career path is offered enabling staff to progress to senior positions via a teaching (as opposed to research) route; these are just two of the initiatives that are slowly leading to a change in culture, where learning and teaching are more widely valued. Moreover, encouraging the use of technology in day-to-day activity of staff is imperative. Getting away from paper submissions and therefore promoting electronic media - for example, student handbooks or any information for students and past projects are all made available via the VLE system - helps to change the culture of the work. Some requirements for changing the culture are listed Appendix I.

TEL.9- Innovation

If the HEI is spearheading educational technology, this involves supporting the university’s innovative unit in creating the next generation systems and innovating educational technologies. An analysis of findings from the National Level Case Study highlight that the future of learning technology has to focus on supporting some main activities: facilitating awareness, fostering engagement and supporting open collaboration or massive collaborations; and innovating in terms of preparing a proof of concept to support decision making. The requirements for innovation in TEL strategy are presented in Appendix I; however, a key challenge in TEL.9 is of course finding a funding body.

TEL.10- E-learning champion network

Another element of the TEL strategy is having a network of departmental e-learning champions to improve the quality of the institution's provision. Every department across the institution has one academic and one teaching administrator or technical person to represent e-learning in their department. With the collective efforts of academic staff and teaching administrators, better solutions to the use of e-learning for staff and students could be found. E-learning champions play a vital role in improving the communication of problems to the e-learning centre or VLE team. Thus, it is highlighted as an effective approach and a good practice to develop localised solutions within each faculty and department and work closely with departments to adapt such technologies that suit their local needs. Moreover, they discuss and exchange ideas between different departments about what they are currently doing and plan to do. An e-learning champion network is also an effective way to exchange experiences to identify and spread the best practices between different departments. There are some requirements for the e-learning champion network in the TEL strategy, as shown in Appendix I.

TEL.11- Institutional partner

Another element of the TEL strategy is considering an institutional partner to help the institution keep up-to-date with the latest development and share experiences. Findings from Case Study 1 reveal that some of the VLE external vendor products get implemented in more than one institution, which enables getting a community of users that the HE institution can actually start sharing expertise with. It is next step after the VLE implementation; it could also facilitate joint online teaching with other institutions thus enhancing the student's learning experience. In order to address this key element of the TEL strategy, four requirements have been highlighted in the findings, as listed in Appendix I. Joining external community of users and participation in e-learning national groups have been indicated as the main requirements, which have significant impact on exchanging knowledge and enhancing the end-user experience.

An analysis of findings from Case Study 1 with national level HEIs reveals that an important aspect of a successful VLE implementation is to enhance usability and adaptability in order to enhance the user experience, which is also a crucial element of the TEL strategy. Findings also indicate that students and staff are the key stakeholders. Hence students are considered at the core of the learning process, universities attract students by offering them more facilities, flexibility, reach and a modern learning experience. The new VLE should be able to offer what the TEL strategy dictates, therefore a successful VLE implementation is crucial and is extensively addressed in this research. Hence this makes a rationale for a conducting a detailed investigation about the efforts HEIs make in order to engage users to improve user experience, which is conducted in Case Study 2 at a local level HE institution. Figure 5-11 shows the overall relation between TEL and VEL in terms of if the attitudes towards, or use of, TEL will improve as a result of the VLE upgrade from a staff perspective.

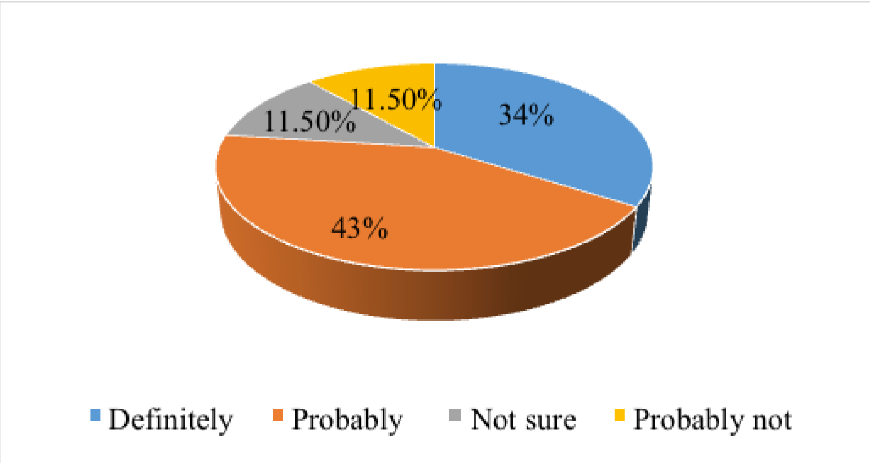

Figure 5-11 Relation between TEL and VLE

It can be clearly seen in Figure 5-11 that 34% of the participants responded with VLE will definitely improve, and 43% thought it would probably improve TEL, thus indicating a clear coherence between the VLE implementation and the TEL strategy. This also endorses the findings, as shown in Figure 5-9, where implementation of VLE is one of the key elements of the TEL strategy.

It is highlighted from an analysis of various HEIs on the successful implementation of VLE that the most crucial element is usability and adaptability; which are also considered as the key elements in TEL strategy in order to enhance the user experience. Therefore, based on the findings from Case Study 1, there was a need to conduct an in-depth investigation to capture the perspective from the two most important stakeholders of a successful VLE implementation, namely the students and the staff. Hence, Case Study 2 was conducted at a local level in a HE institution that recently implemented VLE.

5.2.2 Case Study 2: Local Level

5.2.2.1 Case Study Narrative

For the Local Level Case Study, a London-based university in the UK was chosen because it provides an opportunity to capture the real-time implementation of the VLE system. It is a campus-based university and is home to nearly 15,000 students from over 100 different countries. Founded in 1966, the university has recently spent over £350 million in a campus redevelopment programme and now possesses a range of state-of-the-art facilities. The aim was to obtain a rich, detailed insight into the implementation of the new VLE with complex relationships and processes. The reason for choosing this Local Case Study is the unique opportunity to observe and investigate the entire process of implementation of a new VLE; an in-depth investigation was conducted during the end-to-end implementation process.

Since the institution underwent a recent VLE implementation, fresher knowledge and first-hand experience was gained from this case study. Moreover, since this Local Level Case Study is mainly focussed on capturing the students' and staff's perspectives, their expectations, needs, and difficulties in terms of the usability aspects the participants for this case study are the students and staff of a local university. This case study also provides valuable information for the academic staff mainly to enhance their knowledge about student needs and the ways to meet their needs. This case study focuses on the key elements such as training and support provided as an effort towards usability and adaptability.

5.2.2.2 Background of VLE implementation in the local level case study

At the local level, a HE institution located in London was selected for investigating the implementation of the new VLE system. In April 2011, the university made a decision about upgrading the VLE to the latest version of a commercial vender product. The system went live in September 2012.

For this study, in February 2013, an online survey was distributed to the staff and students from all departments in order to obtain the end-user perspective. Moreover, observations were conducted on three training sessions in different periods of time during the VLE implementation process and on two *Learning and Teaching* symposiums, to capture usability and adaptability of the VLE system, which are strongly related to Stage-8, Stage-9, Stage-11, and Stage-12 of the VLE implementation process (as mentioned in Table 5-2). In this local level HEI, the VLE implementation team consisted of the technical team and the pedagogical team. From January 2012 until March 2012, they started looking at migrating contents to the new VLE system (Stage-8 of VLE implementation, as mentioned in Table 5-2), and organised staff training for the entire university (Stage-9 of VLE implementation, as mentioned in Table 5-2), which continued for the entire summer. All the university staff had access to the contents on the new system before it went live. In September 2012, the new VLE went live where everyone started using the system. The university also launched an app for the VLE called Mobile Learn (Wang and Shen, 2012) to enhance usability; also the university integrated some other tools on the VLE such as the PebblePAD (Sutherland, 2008), which is an e-portfolio system. This was an effort to assess the use and integration of other tools and technologies with the VLE system. An analysis of findings from the Local Level Case Study reveals that active communications during the VLE implementation project are the key to enhance adaptability and usability; moreover, the university provided face-to-face trainings and various resources their staff needed in order to use the VLE system. Staff engagement and buy-ins could be ensured through project team and school meetings, so it is communication and training aspects that are always given more importance as a good practice of VLE implementation.

Furthermore, it was noticed that the university applied several techniques or ways to drive up and ensure engagement with the academic staff, thus changing their behaviour towards using the VLE system. These techniques included keeping the staff involved throughout the VLE implementation process, organising the training programmes that are sustainable and continuous, providing adequate support and resources, and continual evaluations.

5.2.2.3 Difficulties and limitation to VLE adaptability and usability

An analysis of findings from the local level case study indicates an impact relation between the training and the staff perspective in using VLE. The academic staff obviously required the basic needs such as system showing the number of students, which the staff can access. The VLE should also be able to handle different types of contents that the academic staff members want to upload; and it should support the institutional needs. Once the VLE system is in place, it is then all about the practices and training of the academic staff, which is one of the major problem areas, and if addressed successfully, they offer great benefits. Table 5-7 presents difficulties faced in using the VLE system by staff and students of the local-level HEI investigated for this research.

Staff difficulties and limitation	*Student difficulties and limitation*
• Slow and not easy to use and not user friendly • Frequently changed • Restrictive design • Some of the important features are not enabled (e.g. grade marking) • Lack of good instructions on use • Non-intuitive interface • Complicated and consume extra time • Adapting teaching model to help or support model • Difficult to set up online group coursework in non-standard format • Difficult to use files in different modules • Marking and grading is not straightforward and marking release • Massive uploading and personalised delivery of class marks is very problematic • Monitor blogs • Setting up electronic assessments • Student name management • Very hard to do any assessment of performance and progress	• Difficult to use • Lack of good instructions on use • Frequently changed • Inconsistency • Some missing features • Lack of resource • Limited personalization • Not organized • Technical issues • Crashing in peak time • Problem with login • Not properly integrated with other systems or devices • Time consuming • Lack of supporting resources • Limitation on system and interface design • The notification system is not efficient • Quite boring and plain to look at • Cannot organise or categorise according to own preference easily • Accessibility • Access to previous materials • Access to library e-resources • Access through mobile phone • Accessibility issue in general • Remote access student drive space • Lack of one step access

Table 5-7 Difficulties and Limitations of VLE System for Staff and Students in a Local HE Institution

It can be seen in Table 5-7 that the academic staff and students face many similar difficulties in using the VLE system. Moreover, the findings also reveal that frequent changes in the VLE system interface are not helpful for students or staff in terms of adding new features or removing some old features. Moreover, from a staff perspective, it is difficult to use if the VLE system if it is too restrictive in terms of the design, which is a negative aspect of commercial vendor products as compared with the open sources products.

While capturing the students' perspective from the Local Level Case Study, findings reveal that 79% mentioned facing difficulties with the VLE system, which is a significant majority. Out of these, 48% of the students have already been using the old VLE system but still had difficulties in using it, which indicates a clear gap in the adaptability and usability of the technology because no training has been provided to the students; trainings were only focussed on the staff in this local level HE institution. This indicates the importance of organising training sessions for the students as well, thus facilitating usability of the VLE system. Also, an inconsistency in terms of the VLE usage has been indicated by the students – namely that not all academic staff members are using the VLE system. Moreover, student demanded to have all lectures via the VLE. 43% of the students indicated that lack of supporting resources and access to them is a crucial factor in the VLE system usability. Difficulties in accessibility mainly occur in terms of: access to previous materials, access to library e-resources, access through mobile phone, and one-step access. Accessibility has already been mentioned as a CSF in Case Study 1 (Appendix G). Also, other technical issues such as "slow delivery' or "system not responding" affect the efficiency of use of the VLE system. Students of the local HEI reported that lack of some key functions, which were available with previous system, such as resubmitting the coursework, is another difficulty faced while using the new VLE system. Students have also reported difficulties in viewing some of the course contents by using other devices (such as Macintosh). Moreover, they reported that the notification system is not efficient as they do not get any notifications when the lecture notes or materials are uploaded, which is a limitation of their VLE system. From the design aspects, one of the barriers in the VLE uptake and adaptability is the boring interface with plain text to look at. This has also been reported as one of the challenges of VLE implementation in Case Study 1 as user likeness or acceptance (as shown in Appendix H). Moreover, another difficulty is lack of an intuitive interface; for some students it takes quite a while to find what they are looking for (such as grades, feedback, or timetable).

An analysis of findings from the Local Level Case Study also highlighted that most of the technical difficulties such as problems with student log-in or incorrect marks, are faced mainly during the first year when the VLE system goes live because it is not fully-integrated with other systems or services that the university provides such as email and library systems. Students have also complained about limited personalization in their VLE system, because they could not easily organise or categorise contents according to own preferences. Therefore, in order to overcome these limitations, it is imperative to involve students in the VLE implementation process - for example, in gathering the requirements, system testing and obtaining feedback, as also mentioned in Case Study 1.

The findings from the National Level Case Study endorse the findings from the Local Level Case Study in terms of the difficulties faced in using the VLE system. For example, ease of use was one of the main CSFs of the VLE system implementation in the National Level Case Study, and difficulty of use was reported in the Local Level Case Study as the main challenge faced by the end-user, thus endorsing the importance of the findings of this research as its validity is increased from different perspectives. Another example is that most students have reported having technical problems with the login noticeably in the first year of the VLE implementation, which endorses the challenge mentioned in Case Study 1 (presented in Appendix H) as a major issue occurring in the first year after go live. Also in Case Study 1, it was highlighted that one of the good practices of VLE implementation is the student's involvement in system testing, gathering requirements, and obtaining feedback, which would enable tackling with some of the difficulties faced by the students.

5.2.2.4 Efforts and techniques used towards enhancing usability and adaptability

Adaptability and usability of a VLE system is based not only on the staff's attitude, willingness, and interest toward using VLE but also on the usefulness of the trainings provided. This is an important item, which can be linked to the findings from National Level Case Study, including the TEL strategy, in terms of user engagement, that confidence with using VLE can impact on the satisfaction and the level of engagement. Therefore, the local level HE institution adopted some techniques or ways to enhance usability and adaptability of their VLE system.

a) Staff involvement in VLE implementation process

Even if the VLE system is driven by students' demands, it eventually depends on how the academic staff wants to use the system. Findings from National Level Case Study illustrate that staff involvement is the most important CSF of a successful VLE implementation and it has been reported as a one of the good practices. In the Local Level Case Study, the academic staff members were made aware of the change in the VLE system from even before the project started (i.e. early 2010, when the decision was made to change the VLE). In April 2011, the project started, and the project team was set up - that is when the staff was engaged in terms of deciding on input into the project. Table 5-8 shows involvement of the academic staff throughout the VLE implementation process in the local level HE institution.

VLE implementation stages	*How the academic staff members are involved*
Stage-1 Analysis and Review	Academic staff involved in end-user analysis
Stage-2 Planning and Preparation	Participating in IT consultation workshops Academic staff on implementation advisory team
Stage-3 Design	Academic staff involved in an on-going process of developing and maintaining content, adapting to mobile and adjusting to upgrades Participation in discussions with VLE implementation team to modify or update the design of their module section
Stage-4 Development and Deployment	Academics involved as steering group members
Stage-5 Formative Evaluation	Involved in initial pilot in a real use situation with the students Participation in a 1-year pilot phase trialling the system before it is launched across the entire university Participation in feedback
Stage-6 Review and Bug Fixing	No involvement
Stage-7 Integration	No involvement
Stage-8 Migration	Migrating the course material from the old VLE to the new VLE
Stage-9 Staff Training	Academic staff involved as a receiver in the initial VLE system training at both the time of piloting and launching
Stage-10 Final Release and Go Live	Academic staff and all head of departments are informed in advance about the specific date for go live
Stage-11 Continual Training	Involved in supporting colleagues based on their past experiences with the VLE system Continuous training is provided to the academic staff
Stage-12 Evaluation	Academic staff involved in user statistics for the continuous update of content

Table 5-8 Staff Involvement in VLE Implementation Process in Local HEI

Table 5-8 shows that the academic staff members were involved at various stages of the VLE implementation in the local HEI; thus indicating one of the good practices of VLE implementation to engage throughout with the staff. As a result of this good practice, the academic staff members of the local level HEI were successfully using the VLE as on-going users for their various teaching activities, including course management and communications with students through the VLE system.

b) Continual training of staff

Another significant technique that the local-level university applied to enhance adaptability and usability of their VLE system was continuous training, including: drop-in sessions, group sessions, one-to-one sessions, and ad hoc training sessions customised to different departments' needs. Moreover, the training was provided at different levels: basic and advanced. This was to ensure that participants at all levels of IT literacy were addressed. Moreover, the HE institution focussed on the type of training sessions, their schedule, and the topic to mainly focus on.

i. Training programme

It has been noticed that the local level HE institution focused on training programme only for the academic staff members and not for students, which is not a good practice. According to the good practices, trainings should be targeted to both staff and students to encourage the use of VLE. The university, however, provides students with different supporting resources and in future the university is considering organising trainings for students as well.

An analysis of findings from the Local Level Case Study indicates that the training programme was planned ahead in order to provide training before the system goes live and after, for continuous training and support. Trainings were initially offered to the pilot study users, then to all university's academic staff for the incoming VLE replacing the old system. Then the training continued with different types of sessions, such as one-to-one or drop-in sessions, offering a wide range of support resources during the sessions. Once the VLE system went live, the university started to drive new functionality through the system; so the first year was mainly focused on getting more people onto the new system, getting them to use the tools that they have previously used, then trying to get them to use new functionalities of the VLE system. At the basic level, the staff trainings were designed to start with limited topics about the new VLE system that were really important to know, and then at an advanced level introduction was provided to some of the tools describing the system, such as communication tools, the assessment tool, and various other tools that were integrated with the VLE system. The main focus of the training programme was to initially train the teaching administrators representing e-learning in each department. This kind of approach by providing a representative working nearby each department encouraged the staff to use and engage with e-learning activities because they can have immediate support and advice. The training programme started with a series of introduction sessions, then follow-up sessions were conducted to refine or tweak specific tools and features in the VLE system, and finally on-going or continuous training sessions were organised to raise the number of VLE system users.

ii. Trainee level of technology awareness

At the start of the semester, the academic staff members were in need to learn the new VLE system for preparing the course contents, announcements, and adding tools to the course menu. From observing the training sessions, it was obvious that the trainees had varied knowledge about IT or computing skills. It was an interesting observation that most of the academic staff members, with limited IT competency, attended the training sessions just for learning the basic items that they were supposed to use for their course, such as developing a 'course' in VLE, and they were not interested to learn any additional tool or feature. In fact, one of the trainees explicitly stated that he wanted to use only the basic features of the VLE system and was reluctant to learn any advanced features because of limited IT literacy or level of computing knowledge. On the other hand, some academic staff members were quite excited and enthusiastic to use new tools and features in their VLE system because they had computing skills. As mentioned earlier, findings from National Level Case Study illustrated the importance of fostering staff members' technology awareness, and involving them to enhance their understanding about using the VLE system. This point is endorsed by the observations made for the training sessions in the Local Level Case Study.

Thus, an analysis of findings from the observations in the Local Level Case Study reveals that some of the staff members are quite keen to use the VLE system and they want to try it. However, staff members who are not IT literate are not quite receptive to the VLE system because for them it involves a learning curve and will require additional time to learn, which they reserve to do. So, the staff members' competency level in terms of IT literacy and their acceptance level in terms of willingness, enthusiasm, desire, and readiness to use the new tools and technologies, are key impact factors to the usability and adaptability of the VLE system.

iii. Training sessions

An analysis of findings from the Local Level Case Study reveals that getting people to attend the training sessions was the main challenge faced by the staff members training. Encouraging staff members to attend the training sessions is crucial. For the Local Level Case Study, three training sessions in the local-level HEI were attended and carefully observed. The first session was observed in July 2012, which was before the VLE system went live; the second session was observed in October 2012, which was just a month after the system went live for the entire university; and the third session was observed in December 2012, which was at the end of the first semester. The reason for choosing such timings was to cover the entire spectrum of the training provided during the transition period to a new VLE system. It has been observed that for the training sessions, conducted before the system went live, the attendance was poor as the system was not yet live for the entire university; but after the system went live that attendance improved. The training sessions were open to all academic staff members and administrators. It was witnessed that the VLE implementation team commenced the trainings by providing an introduction, and then follow-up sessions to refine or tweak specific tools or features in the VLE system. The training sessions were tailored according to the trainee's skills in IT literacy, for example basic or advanced trainings, which are provided for all staff members on a continuous basis. The trainings were timed according to the trainee needs, such as two training sessions a day where the duration for each session was one hour; thus covering hot topics which were related to the time of year the training was provided. For instance, at that time the staff members were struggling with building their content in the new VLE system. In order to book a training session, the staff members need to go to the staff development calendar and choose a time according to their preferences. Moreover, continuous training sessions were held in terms of running drop-in sessions (with two hours each) throughout just before the go live. Other types of trainings were provided according to the teaching model of each school and each discipline. The training sessions conducted in October, which were just after the VLE system went live, were for each department separate albeit still focusing on the content of the course moved beyond to cover the additional VLE system features and tools that were specifically needed in some departments. This was to offer customised school-based training for the new features or tools integrated to the VLE system. Moreover, whenever any new features or tools are offered on the VLE, their trainings are accommodated in the scheduled VLE block training sessions.

The training sessions were advertised on the university's webpage (intranet) under the staff development page and were bookable online where the trainees could register themselves in advance for attending a training session. However, different types of trainings were provided which did not necessarily require registration in advance, like the drop-in sessions. Moreover, the local-level HEI also organised group sessions and one-to-one sessions. The collective sessions were designed as quick tours providing an overview of the new VLE system in terms of highlighting the differences with the old system and guides to creating new pages. The one-to-one sessions were designed to provide more details with hands-on training, and problem solving for specific individuals. The training sessions took place in a computer lab where a hands-on training was provided on using the new VLE system in terms of going step-by-step through all the basic information, and dealing with the new system. Each trainee was provided with a PC where they could log-in to their VLE profile and work with the trainer. It was observed that the trainer had prepared some materials in advance including a PowerPoint presentation on introduction to the VLE system, a user guide booklet aimed at the academic staff members, which was distributed to the participants. During the training sessions, these supporting resources were provided to the academic staff members. The trainer was willing to answer all the questions of the participants, which were mainly about creating the course content, the announcements on how to create one, how to save it and how to send it to the students, visibility or universality of the announcements, access to the student discussions. The trainees asked many questions and communicated with each other effectively and positively. They also inquired about the transition of materials from the previous system to the new VLE system, and ways to using tools on the VLE system. Other participants asked about the discussion boards and how to monitor students' participation. Basically, the training sessions provided sufficient and satisfactory explanation. The contents of the training were structured and examples were helpful with an initial overall explanation of what they would be looking at rather than jumping into individual parts within the VLE system.

An analysis of findings from the local-level HE institution's case study highlights the fact that a training session is considered as useful if it provides trainings materials such as a user guide, and a nice quick overview that helps to get staff members started using the new VLE system. It is useful to be able to use the training session to get used to the different tools available within the new VLE system. It was also witnessed that a step-by-step guide into the new VLE allows staff members to understand the similarities and differences with the previous system. Moreover, the discussion that staff members were able to have as they went along in the training session with the trainer and their colleagues were quite important and had a useful impact on positively changing the attitude toward the new VLE system. This encouraged sharing of ideas and helped in decreasing the resistance and increasing the level of acceptance for the VLE system among various staff members. The training sessions enabled staff members to look at the VLE system in easy steps, get started with using the system more easily, and feel they can create content straight away which is useful to gain an overall positive impression. It was observed that the training sessions were well-organised offering brief overview of several areas which covered different needs of the trainees with different technical competencies, for example, trainees found it helpful to do an exercise twice. Moreover, the trainees considered, learning how and when things would be migrated from the previous VLE to the new VLE as the most helpful part of the session.

An analysis of findings indicates that it is one of the good practices to conduct short training sessions that are easy to fit into the academic staff member's busy schedule. They should be sufficiently short and directly focusing on adequate training, covering sufficient contents (main functions) for a first introduction to the VLE system. Moreover, the training session contents should not be overwhelming, which is always alarming when learning to use new systems; as well as they should have suitable timings and duration as the academic staff member's time is limited. The sessions should provide lots of opportunities to practise and flexibility to explore aspects of particular interest in greater detail, thus offering opportunity for the trainees to explore them safely by themselves after the sessions. Also pertaining to good practice, the technical competency of the trainer needs to be considered – e.g. if the trainer is knowledgeable, responsive, approachable, and friendly. The trainer should be enthusiastic, and should prepare the materials and check the computers in advance to the training sessions. Moreover, the trainer needs to match the pace of each trainee to ensure that everyone is on the same level and should be able to explain or discuss all trainees' questions, and guide them on efficiently using the VLE system. Also, the training sessions should provide information on how the VLE system can meet the needs of the trainees.

iv. Feedback on the training sessions

Since the training sessions were prepared very well in advance, the feedback was generated immediately following the session. It was observed that most trainees, especially with high IT competency, were very enthusiastic and wanted to apply and use new methods and tools on the VLE system. Feedback was also gathered via emails, where the staff members also mentioned about the problems they still faced in using the new VLE system. Based on such feedback, the training sessions were adapted accordingly and were updated to become better. Findings illustrate that most of the feedback on the training sessions was positive, as shown in Figure 5-12.

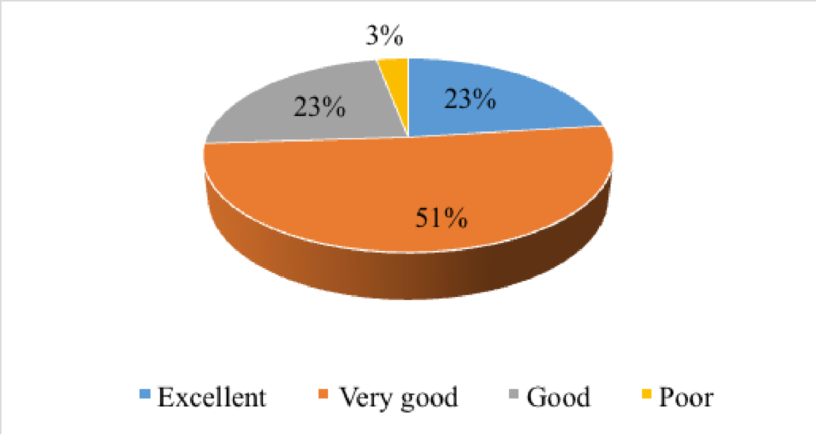

Figure 5-12 Training Session Ratings

It can be clearly seen in Figure 5-12 that 51% of the trainees considered the training sessions as very good, 23% as excellent, and 23% as good, while only 3% rated the training sessions as poor. It is elicited from the analysis of findings from Cast Study 2 that the training sessions should be evaluated in order to improve the sessions, so that they could serve the purpose of trainings in terms of enhancing adaptability and usability. Moreover, capturing and considering staff members' opinions about the training sessions demonstrates the university's intentions to recognise the importance of such trainings to encourage staff members to use the VLE system. As a result of these training sessions, it was noticed from the case study in the local HEI that staff members' engagement with the new VLE system and their confidence of using the system was significantly improved, as shown in Figure 5-13, thus enhancing the adaptability and usability of the VLE system.

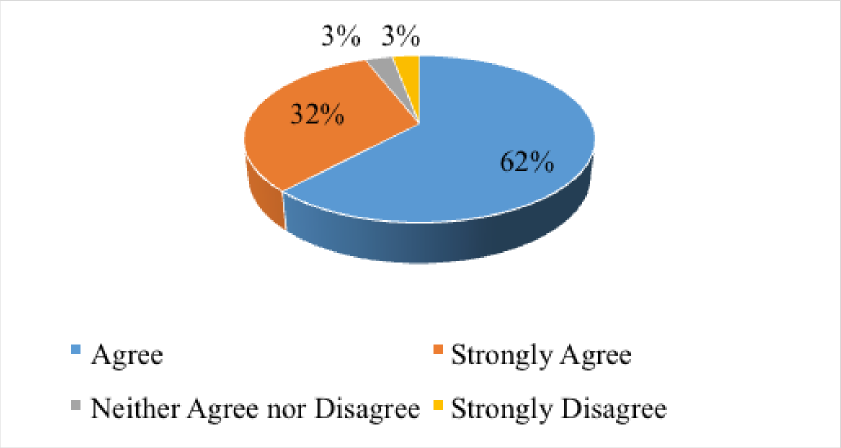

Figure 5-13 Effectiveness of the Training Sessions on Staff Confidence Using VLE System

Figure 5-13 shows that 62% of the trainees agreed that their confidence level in using the new VLE system was increased after attending the training sessions. This endorses the importance for a HEI to consider training sessions and prepare them in advance in order to achieve a successful VLE implementation.

c) VLE support and resources

As another way or technique of engaging VLE end-users and enhancing usability, the local-level HEI provided support and several resources for the main end-users: staff members and students. This is an important aspect, which could be linked to the findings from the National Level Case Study, including the TEL strategy, in terms of assessing the impact of such techniques on end-user satisfaction, level of engagement and confidence with using the VLE system. It is imperative to investigate whether staff members and students receive sufficient support and other supporting resources that they need in order to use the VLE system successfully.

i. Support and resources provided

An analysis of the findings from the Local Level Case Study identified that the local HE institution provided several supporting resources for enhancing the user experience in terms of the adaptability and usability of their new VLE system, as shown in Table 5-9. The *Annual Learning and Teaching Symposium* has become a major event in the university's calendar, which was observed while conducting the Local Level Case Study. This event is held every year; two of them where observed as part of this research. One took place in May 2012 (three months before the new VLE system went live in the entire university), and the other one observed was on May 2014 (when the VLE implementation process was completed). The symposium which was held before the system went live was focused on bringing all the university community together to learn, share, discuss and debate relevant issues. Built around the key themes of the university's Learning and Teaching Strategy, the event included seminars, interactive sessions, and demos to help answer questions raised about the new VLE system. It can be clearly seen in Table 5-9 that the purpose of the symposium is to disseminate best practice; this is done via offering interactive demos and problem solving sessions related to the new VLE system in the Technologies Zone of the symposium. The participants, including academic staff members and students, were able to learn more about how the VLE system can support them. The main focus for the symposium after the VLE implementation process was complete was demonstrations of best practices presented by the academic staff members; it was a showcase of innovative uses of the VLE system and related tools such as the Lecture Capture System tool, and the Discussion tool for collaborative learning, thus introducing a background about each case in the learning and teaching context, implementation, evaluation impact, recommendation and references. Such events/symposiums are considered as one of the good practices in the implementation of VLE.

Supporting resources	*Description*
VLE champions	A community of users that influences and informs the ways in which the VLE is developed in this university. Membership is not restricted, any member of the university's staff members can be a VLE champion
VLE newsletter	Keeps the staff members updated with the latest news related to VLE system
Annual learning and teaching symposium	The symposium disseminates best practices and key issues that directly relate to learning and teaching agenda
Booklet or training guideline	A training guide aimed at the academic staff members for using the VLE system, covering the basics of getting started with developing a 'course' in the VLE system; it is provided during the training session as a user guide
Online wiki system	It serve as a repository for course information and knowledge providing complete information about the VLE, from setup to using different element of the VLE system; contains VLE documentation
Users supported e-mails	To support all users on the VLE
Help tab	It is a tab on the VLE system user interface to provide all supporting resources in one place
VLE blog	Provides up-to-date information about the latest available VLE tools, VLE 'service pack' updates (that occur twice a year), new features in VLE, bug fixes or problems, information about VLE champion and how to become one, and VLE project updates
Qualified teaching administrator	Supports different user needs, provides help to the academic staff members. The teaching administrator gets direct support from the VLE technical team
Knowledgeable and responsive team	Availability of a knowledgeable and responsive team that is helpful in resolving issues with the VLE system
Induction program	Instructions on how to use VLE are provided as part of the induction program for student
Other supporting resources	Lecturer provide support, student union, e-resources, help documentation
Other training resources	These include email, instructions, screen shots and demonstration

Table 5-9 Resources Provided by Local HE Institution

The online wiki system, as shown in Table 5-9, allows course members to contribute and modify one or more pages of the course-related materials, thus providing a means of sharing and collaboration. Users can create and edit pages quickly, while tracking changes and additions, allowing for effective collaboration between multiple writers. Users can create one or more wikis for all course members to contribute to and wikis for specific group collaborations. All members of the course can use the wiki tool to record information; it is a vast source of information compiled by the course members. Wikis can help build a community of collaboration and learning by increasing social interactions during the exchange of information. Moreover, it was elicited from the Local Level Case Study findings that the VLE implementation team started a VLE blog to keep staff members and students informed and up-to-date with the VLE implementation project. The nature of this blog has since evolved to become a place to keep up-to-date with the VLE system to engage a wider community and to generate discourse around improving the use of the university's new VLE system. By reading and subscribing to such blogs, the students and academic staff members are kept informed about the latest updates to the VLE system. It was found that the university's student centre deals as frontline support for all student enquiries and sends a report to the VLE team about different types of enquiries. They also provide sufficient information resources on the university website, which helps in decreasing the student enquiries.

An analysis of findings from the Local Level Case Study indicates that the academic staff members of the local-level HE institution explained to students the various VLE resources available, where they can find the web resources, and how to use the VLE system; it was found that generally students take information quite well from the academic staff members, but they do not read online files about the VLE system. The students are also provided with VLE system inductions at the beginning of the year during the students' induction week, where the VLE team co-presents with either the administrators or the academic staff members, so that the students get to know about the various systems available in the university such as portfolio system, wiki, or blogging systems. Also, the academic staff members disseminated department-specific information to the student, for example, the coursework coversheet and submission style or format. It has been illustrated from the analysis of findings from the Local Level Case Study that members of the local HEI's VLE implementation team were on-hand to assist staff members to solve any problems they might be having while getting to grips with their new

VLE system. The VLE implementation team migrated almost all academic modules into the new VLE and enrolled the academic staff members on the appropriate content before the academic year started. However, the academic staff members were required to build their own contents and migrate their old contents to the new VLE system themselves. All courses were available on the new VLE system approximately two months before it went live in the beginning of the academic year. The academic staff members were encouraged to get started with developing their contents for the next year. Self-serve resources were developed to provide a step-by-step overview of copying content from last year course to the next year course in the new VLE system. Moreover, the VLE implementation team provided support and help to the staff members if they had any issues or problems logging in they could email them and the VLE implementation team would resolve their issues. There are user guides to this process available on the university's website and on the VLE page. Also, the VLE implementation team provides help with organising academic staff members content in special training sessions (called the *Tweaks and Tidy-ups* training sessions).

ii. Further support and resources required

An analysis of findings from the Local Level Case Study at a local HEI illustrate that the support provided to the academic staff members had so far been sufficient; however, more online resources were needed which will enable staff members to overcome difficulties themselves and save their time. The academic staff members emphasised the importance of continually improving the VLE system usability for them and for the students, considering more online help function or resources and obtaining sufficient support from the VLE implementation team. Also, findings from the Local Level Case Study illustrate that student required further supporting resources in order to use the VLE system.

Analysis of student responses indicate that 43% of the students mentioned that they receive sufficient support, 13% considered VLE easy to use and not much help or support is needed, whereas 44% mentioned that more supporting resources are required, as shown in Figure 5-14

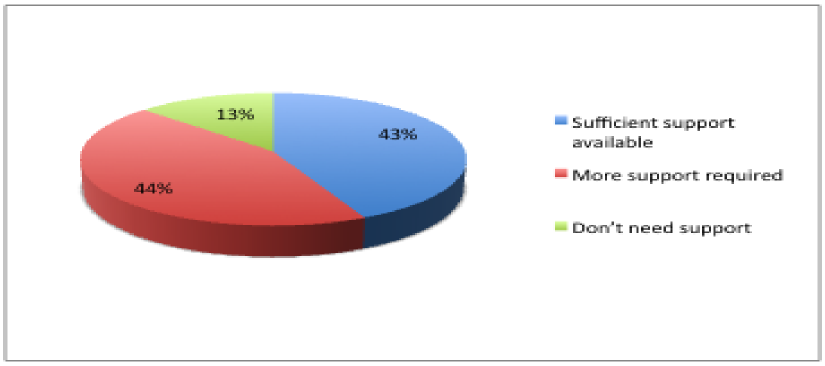

Figure 5-14 Student Responses on Further Support and Resources Required

It has been illustrated through the findings from the Local Level Case Study that many students are unaware of all the supporting resources that already exist; this highlighted the need to advertise more on the available VLE supporting resources provided by the university. Table 5-10 presents some examples of the VLE system supporting resources that are required by students and staff members.

Student requirements	*Staff requirements*
Advertising where student can find help in using VLE	Self-help resources
Demonstration on how to use VLE	Online demonstrations
HELP section on the portal	Instructional videos
Need video tutorials and user guides	One-page guides for various user levels
Instructions to student in induction program	More examples for technically advanced and for basic VLE functions
Email response to student enquiries	More resources in the HELP section
Social network for university students only	FAQs or good search system
Dedicated training sessions aimed at students	Online user manual or user guides (HTML not PDF)
More online facilities	Demo videos/screencasts that do not require sound

Table 5-10 Student and Staff Requirements for VLE System Supporting Resources

An analysis of findings shows that the academic staff members are interested in using self-paced training when they are getting to grips with using the VLE system. Basic one-page guides are always helpful with something new, as they can save time. Also, the academic staff members indicated that it would be most useful to offer some sort of searchable topics database or FAQ, so that if they face any issue they could search for a keyword and get a link to that topic with instructions on how to accomplish particular task, or even just information on who to ask for help and how. Moreover, it has been indicated from the findings of the Local Level Case Study that it is a good practice to offer the academic staff members with customised resources according to their preferences as some of them prefer to skim through a textual description faster rather than watching a five-minute instructional video. Findings show that the academic staff members prefer exploring the self-help resources, as it is sometimes difficult for them to find the time to attend the training sessions. Moreover, they want to use the supporting resources according to their needs – e.g. various levels of guides would be useful for staff members starting with an overview of the VLE system with new features, which can be supplemented by more detailed guides on each feature. However, most academic staff members seemed to be interested in only very basic features such as making information available to students in the easiest way possible, and sending messages or announcements. Generally, the academic staff members needs further support with regard to making groups in VLE, giving grades to students, and creating surveys for the students. It is important for the VLE implementation team to communicate with all parties in terms of providing support to the academic staff members and the students, have regular monthly meetings with them, and provide help with new enquires.

Findings show that it is considered as a good practice to provide supporting resources for all end-users - this is very important at this stage because small teams cannot meet up with everybody. Students must be able to access the support online and download guides and videos. Moreover, it is considered as a good practice to assign a qualified teaching administrator in each school providing help and support to different users.

d) Continual evaluations

This technique covers students' and staff members' perspectives where different usability aspects, key expectations and enhanced user experiences are extracted. An analysis of findings from the local level HEI case study shows that a good practice of VLE implementation is to conduct evaluation continuously, which includes arranging regular meetings to see whether things are proceeding well in terms of the VLE system being used by the academic staff members, or if all courses are developed using the VLE and so on. The evaluation in this local university was carried out even after the VLE system went live; however, evaluation of the pilot was very carefully conducted because they had to learn from the pilot for the campus-wide implementation, then evaluate again in the beginning of the academic year to see that everything is working well, and also by the end of the year they conducted a final evaluation again. It has been reported from the Local Level Case Study that evaluation should be conducted from time to time and the HEI needs to act in response to the results of the evaluation; the university needs to be quite sensitive and responsive to the feedback. Every university in the UK has to administer a student satisfaction survey, and so there is ample, good quality data on this. The students' satisfaction survey is nationally imposed by the government; however, most quality assurance departments would also require such surveys to be conducted regularly, so each member of the staff members is expected to conduct a student evaluation at the end of their courses. The evaluation system looks at the students and staff members' experiences at the end of each academic year, and then try to revise, update, improve, or enhance the VLE system for the next academic year. This is practiced each year to draw a comparison with last year's evaluation, so there is a yearly cycle of such improvements or revisions. Moreover, from the research point of view, conducting evaluations enables the HEI to obtain a valuable insight into the learner's experiences in terms of why the technology worked or did not work from the pedagogical perspective, which is considered as an important element to guide the next round of implementation. In this respect, students' satisfaction is considered as a crucial element in enhancing the learner's experience, which can be assessed through generating feedback from the students. Academic staff members are the key element of e-learning effectiveness, and some of them are hesitant to use technology, thinking that they will be replaced by it. In fact, the academic staff members have to be in the centre of using technology; if they are not encouraged to go online then their students will not go online either. The academic staff members needs to interact with the VLE system and make things available for their students online, and need to be reactive with their feedback and comments.

i. Capture of end-user feedback

As part of the continual evaluation, it is imperative to capture end-user feedback about the VLE system throughout the implementation process. Generating feedback from the academic staff members and the students is considered as a way of engaging the end-users in the VLE implementation process. The way to capture end-user feedback is different from one HE institution to other. It was reported in the Local Level Case Study that amongst various techniques to capture end-user feedback, the most commonly used are online questionnaire (via email or on the VLE website homepage), end-user group meetings, and drop-in sessions allowing interacting with the staff members and listening to their problems or difficulties with the VLE system. The feedback usually related the academic staff technological needs and what they would like to have as an improvement in the VLE system. An analysis of findings from the local level HE institution illustrates that one of the good practices is to consistently capture end-user's feedback at different stages of a VLE implementation, especially in the analysis and reviewing stage, and in the formative evaluation stage (Stage-1 and Stage-5 respectively, as shown in Table 5-2). The feedback is gathered in Stage-1 to assess the status of end-user satisfaction of the current VLE and their expectations from the new system, and is crucial for the HEI to make a decision accordingly. The feedback is initially gathered in Stage-5, when the pilot study is running, to make changes to the system consequently. Once the final version of the system is live and is used by everyone, it is important to recapture feedback from the end-users.

In the Local Level Case Study, it was observed that the academic staff members of the local HEI were engaged in a pilot study that initiated with one of the schools in the university. Champions from eight other schools were also asked to provide their feedback; this was to cover opinions from different schools. It was noticed that the VLE implementation team acted based on the feedback from academic staff members and students generated during the pilot study and continued constantly. Due to the trainings, feedback was positive from the pilot study (as illustrated in Figure 5-15), and therefore, not many changes were needed; however, they did make some minor changes to the VLE system in terms of making things easier.

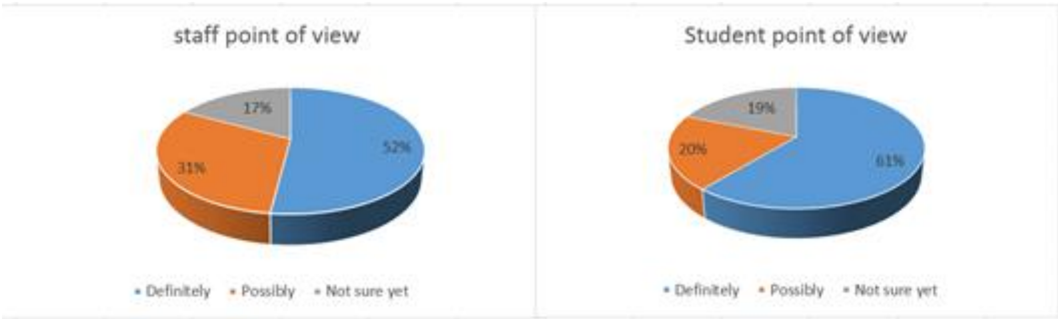

Figure 5-15 Improvements in the New VLE Over Previous Version

Figure 5-15 shows that 52% of the academic staff members (attending the training sessions) considered the new VLE as an improvement over the previous system, thus reassuring the importance of training sessions for enhancing user acceptance, which was reported as one of the main challenges of VLE implementation in the National Level Case Study (presented in Appendix H). Moreover, in terms of the usability, findings from the Local Level Case Study indicate that 61% of the students considered the new VLE as an improvement over the previous version, as shown in Figure 5-15. The improvements were reported with the following characterisations for the new VLE: innovative, more professionally organised, easier and clearer, more efficient, and the academic staff members are using it more than before. Moreover, having new features such as mobile app, notifications for updates, integration with social media were also considered as improvements to the VLE system. It has been noted in the Local Level Case Study that surveys are a preferable means of gathering feedback from students.

ii. Periodic evaluation

From the analysis of findings from the Local Level Case Study it has been identified that conducting periodic evaluations is one of the good practices to enhance usability and adaptability of the VLE system. This includes end of module feedback generated by students about their experience with the VLE system during that module. Once the information is collected, it then goes to the Level Coordinators and then the Undergraduate and Postgraduate Directors, and they can make further considerations on any major highlighted issues when the VLE system is updated for next academic year. Furthermore, staff members' meetings are conducted each year over the summer to discuss the issues raised from the students' feedbacks, where they focus on resolving those issues, thus making it better for the students in the next academic year.

An analysis of findings from the Local Level Case Study illustrates that the HE institution has three types of feedbacks generated during the implementation of the VLE: 1) pilot study, where a new piece of technology is rolled out; 2) National Student Survey (NSS); and 3) module feedback, at the end of term either online or in physical format. Moreover, there is an annual ICT survey.

The Local Level Case Study also captured end-user satisfaction in terms of meeting staff members and student needs (as shown in Figure 5-16); findings show that 40% of the staff members participated in this survey indicate that the current VLE does not meet their needs, 33% are ok with it, and 27% mentioned alright - neither good nor bad.

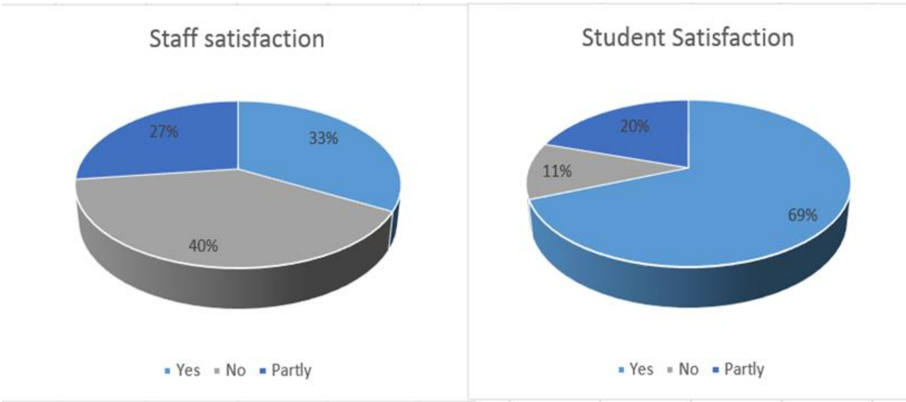

Figure 5-16 Level of Staff and Student Satisfaction with the VLE System

As for the students, 69% of those participating in this research mentioned that they are satisfied with the online aspect of their course, and only 11% mentioned that they are not satisfied with their current VLE system and 20% mentioned that they are partly satisfied. It was elicited that the VLE system in the local HEI, mostly, met the communication needs with students allowed dissemination of material and uploading of coursework. It was found to be quite easy to use, reliable, and always available, providing a good communication platform for students and for the staff members as well.

5.2.2.5 Student's and Staff Members' Expectations and Perspectives on VLE Improvements

Although, the majority of the academic staff members and students that participated in this study were satisfied with the online aspects of their courses, they required more improvement on the VLE. Students reported that they required further learning resources, such as link to relevant video/audio resources, online library links, other supporting resources (e.g. for the development of skills for writing academic papers or help with using some research and analytical tools like the SSPS), further reading materials or conferences papers about related topics. Students believe that a VLE system could be improved by providing more flexibility and the university should meet student expectations by providing advanced features such as remote access to the students' drive space and synchronisation with documents or files from the previous system. Academic staff members and students reported that when two systems overlap in the first year of go live, several technical problems occurred in the transition period from the old to the new system, affecting the usability of the VLE system; the institutions need to improve on this by providing extra support for both systems in this period. The VLE system should not crash in peak times and should be able to handle high usage traffic. This is also considered as one of the requirements in the proposed framework (mentioned in Chapter 6), thus emphasising the importance of this expectation. Moreover, as a further improvement, relational integrity is required across other applications (such as email integration) or services provided by the university such as student services on loan and counselling, jobs and career services, library services and student unions. Students also indicated their need to have regular notifications; therefore, it is imperative to provide an effective notification system for announcements, which was also indicated as an important requirement from the National Level Case Study. From the staff members' perspective, improvements could be made in terms of ease of e-assessments and responsive interactions, as shown in Table 5-11, which presents expectations from the academic staff members and students from the new VLE system at the local HE institution to support the learning processes.

Staff expectations	*Student expectations*
• Ease of use • Efficiency and flexibility • Ease of tailoring look to non-teaching requirements • Easier arrangement of personal landing page • E-assessment and marking • Responsive interaction • Attractive and better usability • Consistency and reliability • Learning analytic • Continuous availability • Embed multi-media • Facilitate communication with colleges and with students and sending announcements • Increased student engagement • Making material online • Medium to send announcement to student • Other features (e.g. to merge current mail account with module accounts) • Online group coursework • Organise IT content and group and discussion list	• Easy to use and self-explanatory • Efficiency and flexibility • Ability to personalise and customise • More interaction with academic staff members • Clearer signposting, notifications, and layout • Availability of FAQs regarding courses and topics • Easier to navigate and more organized • Availability of e-assessment, grading, and e-feedback • Auto-marking assignments • One step access • Learning analytic • Online lectures with live streaming and recording • More support and learning resources • Remote access to student drive and more data space • More effective and intuitive • Better communication aspects • Better integration of other technologies and tools • Minimise technical problems • Better accessibility to material • Ability to view the result of each module within the module itself • Provide past papers, online exercises, and work examples

Table 5-11 Expectations of Staff and Students from the New VLE System

It can be clearly seen in Table 5-11 that both students and staff members expect ease of use, efficiency, and flexibility from the new VLE system. This expectation is also emphasised in the findings from the National Level Case Study that the system should be easy to use and self-explanatory thus enabling the academic staff members and students to work on the system independently. Although both expect continuous availability, for the staff members it is due to reliance on the VLE system in their teaching for distributing lecture notes and communicating with their students, whereas for the students it is due to flexibility in terms of using the VLE system that is accessible from anywhere. Both staff members and students expect to extend their use of VLE system to cover e-assessment and e-feedback, as well as other features such as the learning analytics. It is interesting to note that students were more enthusiastic for using and applying new technologies, whereas staff members looked forward to having more functionality and reliability. Furthermore, an analysis of findings from the Local Level Case Study shows a strong emphasis from students on the ability to personalise the VLE system, which students claim would become a significant improvement in the VLE system; they want to present all module-related information in their personalised page with their personal calendar or timetable, to do list, results, important dates, assignments and other notifications. Moreover, having a more personalised interface that is organised and categorised according to their preferences in terms of the colour, format, layout and themes could also improve the VLE system. One of the key feedbacks was that a friendly interface is very important for the usability (ease of use). Hence, the appearance of the interface is important for acceptance and increased usability among the students and academic staff members. Also, offering more communication channels with academic staff members could be another improvement to the VLE system.

It was reported by students that the course material on the VLE system appears more like the notes for class attendees saved onto a system, while it needs to be specifically designed and developed for online use. This highlights the importance of better course design to suit online courses, also indicated by the VLE system implementation team in the National Level Case Study. In case of this local HEI in the Local Level Case Study, the VLE system was a commercial vendor product, and therefore not much consideration was given to the course design phase, which was mainly conducted by the academic staff members themselves. Moreover, students of the local-level HEI also reported a limited use of the VLE system by the academic staff members that needs to be improved in terms of more and consistent use of the VLE system, especially by the staff members themselves. Table 5-12 shows most frequent uses of the VLE by the academic staff members.

VLE system's most frequent uses	*Use (%)*
Post lectures slides	85%
Provide different resources	75%
Post relevant information /announcement	70%
As a communication channel	64%
Assignment and feedback	60%
Discussion boards	50%
Use social media (e.g. Twitter feeds)	44%
Mobile learn	30%

Table 5-12 Most Frequent Uses of VLE System by Academic Staff

An analysis of findings from the Local Level Case Study shows inconsistency in the use of VLE system, especially by the academic staff members. The students mentioned that some academic staff members are using VLE, whereas some do not use it at all. Moreover, the degree or level of VLE use varies between the academic staff members considered to be VLE users. As shown in Table 5-12, the VLE system is mostly used for posting lecture slides, other relevant information, coursework, and announcements, which is considered as a basic use corresponding to student expectations and needs. On the other hand, some of the academic staff members expand their VLE use to serve their pedagogical practices by exploiting discussion boards, social networks, mobile learning, audio feedback, and lecture recording, as well as sharing different types of resources with students. Findings from the Local Level Case Study reveal that students expect more interaction and frequent use of the VLE features (as mentioned in Table 5-11), therefore in order to meet their expectations the HEIs need to know what students expect from the VLE system and what they want to achieve with it, thus bridging the gap between the students want and what is provided by the VLE system.

Noticeably, an interesting finding was that students were distinguishing between the academic staff members who are purposefully using the VLE system and the ones misusing the VLE. This endorses the importance of developing the digital literacy (as considered in the proposed framework in Chapter 6) of the academic staff members to reduce misuse. Furthermore, students were not accepting academic staff members who experience difficulties in using the VLE system. Students reported that the lack of IT literacy or technology awareness from the academic staff members, in some cases, has caused delays in posting feedback on their coursework. Findings also show that inadequate timing is an issue; choosing the right time of upgrade and announcement, time of up-loading the material has to be considered by the academic staff members. The academic staff members need to consider when it is suitable to upload, which is also part of the digital literacy (to know when, where, and what to use). Purposeful and thoughtful use of the VLE system is required from academic staff members.

On other hand, students seem quite enthusiastic about using the technologies and new features on the VLE system. Findings from the Local Level Case Study report a good use of VLE by the students by using VLE in different ways as an enhancement tool with more interactive ways. It is noticeable that most students are quite mature in using technology in the best way and can judge the good or bad use of the VLE system; this is not only because of their educational level as university-level students, but also as a result of a changing culture as an external factor where the intervention of technology is prevalent in various aspects of their lives, which cannot be ignored in the educational sector as well. In fact, one of the students who participated in this research stated:

> *"Whilst some tutors have used new features and their understanding of IT to their potential, I feel some tutors may have been pushed into using features of VLE that they don't really understand themselves. This has added a great deal of confusion along the way to both the tutor and the students. Tutors need to be shown how to effectively use all features"*.

Therefore, by considering the students' perceptions about the VLE system use, the academic staff members cannot afford to ignore the need to enhance their understanding of the VLE system and cope with the increasing demands and new ways of learning of the students. However, not many academic staff members recognise the importance of considering the students' perspectives on VLE system use. Findings from the Local Level Case Study reveal that there is not much interaction via VLE system between the academic staff members and the students; as illustrated in Table 5-12, the VLE system is most frequently used as a repository for lecture slides or posting relevant information, but not much as an interaction tool.

It is worth mentioning that the local-level HEI, investigated for the Local Level Case Study, recently conducted an independent end of year student survey for their VLE system use in 2014, with 450 participants. The survey discovered areas of good practice that students find useful in support of their studies. It is commendable that the results from this independent survey are similar to the findings of this study, thus endorsing the findings from the Local Level Case Study and adding credibility of the results to this study. An analysis of findings from the Local Level Case Study reveals the fact that the measure of e-learning effectiveness is a combination of a sufficient and reliable VLE system, skilled, aware and willing academic staff members, who can meet learner's demands and expectations. The findings from the Local Level Case Study validate and are in line with findings from the National Level Case Study, thus endorsing the involvement of the key stakeholders, academic staff members and students in the VLE implementation process, which is considered as one of the good practices of VLE implementation. Also, the Local Level Case Study indicated that training and supporting resources were mainly provided to the academic staff members, and students clearly indicated the need to have more support in using the VLE system. The Local Level Case Study highlights the importance of trainings, continually considering end-user feedback, and maintaining student satisfaction as the key factors that encourage end-user engagement and help increase satisfaction thus enhancing their learning experiences.

5.3 Tools, Technologies and Methods Integrated with VLE

Findings from both case studies reveal that an important process in the VLE implementation is integration with other tools and technologies. This includes integration with complementary technologies that are not available on a VLE. By doing so, the VLE becomes a central media space for various tools which are not part of the VLE system as such, but are integrated with it in a way whereby users can easily access the link to these tools; for example, the integration of a VLE system with an e-portfolio at the design interface level enhances learners' experience and increases students' engagement, thus making VLE an aggregator of the technology, rather than being an autonomous environment. Moreover, findings show that when choosing technology, there is no one-size-fits-all, it is imperative to consider the learners' competency level and what is intended to be delivered as different subjects have different e-learning needs. It does not have to be a very sophisticated technology to be effective - in fact it is advisable to use technologies that are easy to learn and the end-users are familiar with or possess appropriate know-how to use them. An analysis of findings from the National Level Case Study highlights that in a good practice, VLE implementation may involve integration with different technologies, tools, and methods. A list of such tools, and technologies that are categorised as elicited from the case study analysis is provided in Table 5-14. It is fundamental that such tools are integrated with each other, and having them integrated with the VLE is crucial thus making it easy for the students to find, navigate, and access everything they need from one location.

Technologies facilitate the wide accessibility to different resources at any time. Findings show interesting diversity in practice in terms of the use of technology, where social networking is the most frequently used technology (e.g. Twitter, Skype, Google Plus, Facebook and Flicker). The popularity of technologies such as multimedia facilities providing a range of learning resources of different natures, including lecture recordings, simulations as well as discussion boards, blogs, wikis, and e-portfolios and smartphones also highlight that communication tools constitute a quite crucial and one of the most important aspects of the VLE implementation. Since communication is an important aspect of the overall learning process, VLE should facilitate communication by providing such communication tools that support various educational processes, including assessment, content delivery, and course management. Moreover, it has become imperative for VLE systems to have integrated multimedia facilities providing a range of learning resources of different natures, including lecture recordings, simulations, and electronic resources, such as online library or e-books to offer additional value besides submitting coursework and getting feedback or marks.

It has also been illustrated from the analysis of findings that the basic use of all VLE systems is mainly to do uploading the materials or information about the assignments, course work requirements, and accessing handouts; however, pedagogically VLEs have been underutilised. For example, the current use of VLEs does not seem to use all the learning theory and is merely used for publishing textual information; but still for the students, even that actually works and proves to be helpful as it supports collaborative work. In this regard, VLE systems provide an opportunity to deliver multiple learning styles depending on the learner’s preferences of visual or audio mode of learning, or if they like to engage into group discussions or learn from other people’s experiences. VLE systems not only assist in managing the teaching of large groups, but also enhance the availability/ opportunities of learning by eliminating time dependency, so students can learn at any time that is suitable to them; therefore flexibility is an important factor. An analysis of the findings from Local Level Case Study also reveal the end-users’ perspective towards the mainstream tools and technologies that are integrated with the VLE as shown in Table 5-13.

Tools and technologies	*High*	*Medium*	*Low*
Collaborative tools	70%	10%	20%
Multimedia tools	69%	23%	8%
Interactive tools	62%	20%	15%
Live audio/video streaming	61.5%	15.5%	23%
Simulation and modelling tool	60%	10%	30%
Graphics tools	58%	33%	9%
Blogs, wiki	54.5%	18.5%	27%
Game-based learning (gamification)	50%	41.5%	8.5%
Web 2.0	50%	40%	10%
Programing tool	50%	20%	30%
Video conferencing (e.g. Webinar)	46%	23.5%	30.5%
E-portfolio	46%	16%	38%
Cloud technology	40%	40%	20%
Open sources software	40%	10%	50%
Handheld devices (iPad, tablets, smartphones)	38.5%	23%	38.5%
Social media or networks (such as Twitter, Facebook)	37%	35%	28%
Adaptive hypermedia	34%	33%	33%
Semantic web and linked data	30%	30%	40%
Immersive virtual environment	30%	20%	50%
Podcasting (e.g. audio feedback)	27.5%	36.5%	36%

Table 5-13 Key Enabler Tools and Technologies for E-Learning

Table 5-13 presents the key enabling tools and technologies for the learning solutions. It can be seen that 70% of the respondents highlighted collaborative tools, 69% suggested multimedia tools and 62% suggested interactive tools as key enabling technologies that the VLE system should include or support. Moreover, availability of the audio/video lectures was another most common technology reported to enhance VLE usability. Findings from both case studies reveal different tools and technologies that are categorised, as shown in Table 5-14.

Categories	*Tools and technologies*
Web-based technology	Internet or web
	Cloud technology
	Game-based learning (gamification)
Web communication technology	Email
	Web asynchronous communication
	Live chat
	Blogs (learning journal)
Collaborative web technology	Collaborative environments
	Video conferencing (e.g. chat, webinar)

<table>
<tr><th>Categories</th><th>Tools and technologies</th></tr>
<tr><td rowspan="5">Interactive tools</td><td>Wiki</td></tr>
<tr><td>Personal respond system (PRS)</td></tr>
<tr><td>Whiteboards</td></tr>
<tr><td>Discussion board</td></tr>
<tr><td>Simulations and modelling tools</td></tr>
<tr><td rowspan="4">Multimedia tools</td><td>Multimedia (video, audio, YouTube)</td></tr>
<tr><td>Video and audio streaming and live audio/video streaming</td></tr>
<tr><td>Adaptive hypermedia</td></tr>
<tr><td>Podcasting (e.g. audio feedback)</td></tr>
<tr><td rowspan="2">Social networking</td><td>(E.g. Twitter, Skype, Google Plus, Facebook, Flicker)</td></tr>
<tr><td>Web 2.0</td></tr>
<tr><td rowspan="3">Assessment tools</td><td>Electronic assignment submission</td></tr>
<tr><td>E-assessment tool</td></tr>
<tr><td>E-portfolio</td></tr>
<tr><td rowspan="3">E-learning platforms</td><td>Immersive virtual environment</td></tr>
<tr><td>Open source software</td></tr>
<tr><td>Personal learning environment (PLE) systems</td></tr>
<tr><td rowspan="2">Mobile learning technology</td><td>Mobile devices</td></tr>
<tr><td>Smart devices and handheld devices (e.g. iPad, tablets, iPhones, smartphones)</td></tr>
<tr><td rowspan="5">Other tools and technologies</td><td>Learning activity design tool</td></tr>
<tr><td>Electronic resources (e.g. electronic textbook, online library)</td></tr>
<tr><td>Semantic web and linked data</td></tr>
<tr><td>Programing editors technologies</td></tr>
<tr><td>Graphics tools</td></tr>
</table>

Table 5-14 Categorisation of Tools and Technologies Integrated with the VLE

It was reported through both case studies that VLE should not only offer virtual classes, but also act as a multimedia communication tool using, for example, social media. It should support pedagogical practices using learning methods, such as lecture recording, podcast, audio lectures, and video conferencing or webinars.

The VLE system can also have other integrated tools to support learning methods such as discussion tool, announcement and notification tools, and online assessment tool. Thus, one way of empowering the VLE system is making it interactive, which entails integration with different tools and technologies to encourage interactivity, getting students talking to each other and sharing ideas, getting them engaged in proactive discussions in the discussion boards, and linking with other technologies such as social media.

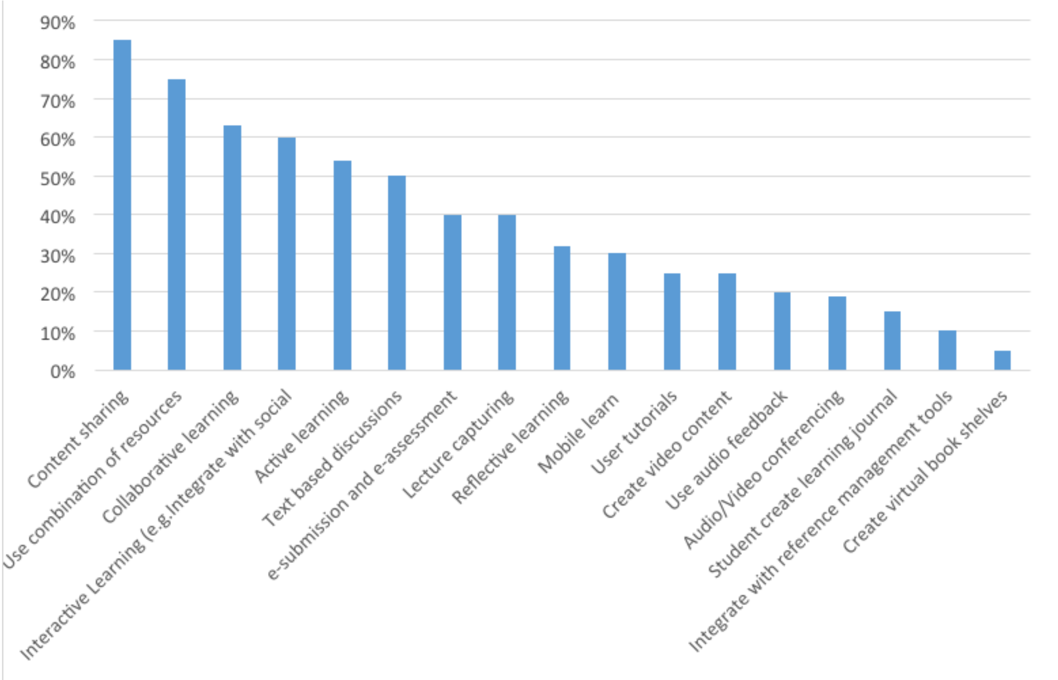

Figure 5-17 Learning and Teaching Methods

Figure 5-17 shows the key learning and teaching methods integrated with the VLE. The choice of which teaching and learning methods to integrate with a VLE system very much depends on the academic drive and on what the HEI intends to achieve. Academic staff members need to support students to achieve their goals by developing approaches to teaching that influence, motivate, and inspire students to learn. A list of learning and teaching methods integrated with a VLE system is presented in Table 5-15.

Categories	*Learning and teaching methods*
Interactive learning	Interactive videos for learning
	Interactive learning (e.g. integrate with social media)
	Text-based discussions
Collaborative learning	Collaborative learning activities
	Audio/video conferencing
	Web seminars and broadcasts coaching
	Video communications including chat, personal web

Categories	*Learning and teaching methods*
	conferencing, electronic focus groups
Self-based learning	User tutorials
	Integrate with reference management tools
	Create virtual book shelves
E-assessment	E-submission and e-assessment
	Use audio feedback
Creative learning	Create video content
	Student create learning journal
Other teaching and learning methods	Content sharing
	Use combination of resources
	Lecture capturing
	Reflective learning
	Active learning
	Mobile learn
	Flipped-classroom

Table 5-15 Categorisation of the Learning and Teaching Methods Integrated with the VLE

Table 5-15 shows various categories of learning and teaching methods integrated with the VLE system where content sharing was reported as the most commonly adopted method in a VLE system, as well as use of combination of various learning resources. Thus, providing the learning material in a flexible and useful way and using technology to facilitate the teaching and learning process, for example, video conferencing is great for collaborative work by offering students the real experience to interact with other students belonging to different cultures and countries. Moreover, video conferencing could enable working across different time zones, and providing remote access to academic experts; thus opening up the possibility of learning enormously.

5.4 Specifications and Requirements for VLE System

An analysis of findings from both case studies, with national-level UK universities and one local-level HEI, reveal that conducting focus groups with various stakeholders, including staff members and students, has been identified as the good practice for gathering requirements and for clarifying or highlighting the specifications for a new VLE system. From the learner’s perspective, a VLE system needs to provide a good user experience, which means more than just being usable, being fun, being engaging and so on. Hence, one of the important criteria from a learner's perspective is a high level of user experience. Various specifications and requirements for different situations depend on the overall model of learning of the HE institution (i.e. blended learning or pure online learning); it also depends on the end-users' needs in terms of deciding which e-learning technologies are more suitable to their needs. One of the e-learning technologies possibilities is VLE, in which many universities invest a lot of money. HEIs provide a list of various features they need in a VLE system; it often depends on what they want to achieve, or how the system can assist them in doing so, for example, by implementing next generation systems or innovating educational technologies; however, it must be noted that it is not feasible to achieve everything and there is no such system which can do everything but the key feature is that the VLE system enables integration to any other system or tool. Table 5-16 shows the key functional and non-functional requirements for the VLE system that have been reported from the National Level Case Study and the Local Level Case Study. One of the key functional requirements for a VLE system is the ability to integrate with different e-learning tools and technologies, include different type of multimedia in the content, and generate notifications and alarms as they want to get regular announcements of latest updates in each of their modules, including notifications about their courses and deadlines, news, clear and concise information about all the relevant modules, messages, assignment information, online feedback and grades or results.

Functional requirements for a VLE system	*Non-functional requirements for a VLE system*
FUN_REQ.1 ability to conduct e-assessments	NFUN_REQ.1 enhanced user experience
FUN_REQ.2 ability to generate notifications and alarms for various activities within the VLE	NFUN_REQ.2 conforms to the technical architecture requirements that are set out by the ICT technical architecture checklist
FUN_REQ.3 provision of discussion forums	NFUN_REQ.3 meets the accessibility standards of the university
FUN_REQ.4 provision of variety of tools (as part of VLE or 3rd party products)	NFUN_REQ.4 user friendly, intuitive, and ease of use
FUN_REQ.5 ability to see tracking for each student	NFUN_REQ.5 implementation or commitment to common standards
FUN_REQ.6 ability to group students and provision of group workspace	NFUN_REQ.6 provision of suitable help documentation
FUN_REQ.7 ability to create and view announcements	NFUN_REQ.7 enable use of different browsers
FUN_REQ.8 ability to selectively release items in the VLE	NFUN_REQ.8 meets performance standards of typical he institution
FUN_REQ.9 provision of a customisable and searchable VLE user database	NFUN_REQ.9 ability to cater for concurrent high usage without failing
FUN_REQ.10 ability to integrate with other e-learning and university systems	NFUN_REQ.10 flexible licensing to cater for external user
FUN_REQ.11 ability for VLE administrators to manage user roles	NFUN_REQ.11ability to easily migrate content from the previous system
FUN_REQ.12 ability to enables use of different browsers	NFUN_REQ.12 meets the mandatory security standards
FUN_REQ.13 ability for staff members and administrators to create and administer courses	NFUN_REQ.14 ability to customise the VLE interface
FUN_REQ.14 ability to manage user enrolments	NFUN_REQ.15 provision of role simulation ‘views’ for staff members
FUN_REQ.15 ability to add multimedia content and links to document with VLE	
FUN_REQ.16 support hand held devices and mobile	
FUN_REQ.17 ability to manage files and content within the VLE	
FUN_REQ.18 ability to backup, archive, and restore	
FUN_REQ.19 ability to personalise	

Table 5-16 Key Functional and Non-Functional Requirements for VLE System

Moreover, a VLE should offer a powerful e-assessment tool allowing staff members to: provision marks and feedback on assignments, provision of a grade book for storing and viewing grades, ability to create and deliver quizzes and surveys, and ability for students to submit assignments. It can be seen from Table 5-16 that enhanced user experience is one of the top non-functional requirement and it aligns with the TEL strategy, mentioned in the later sub-sections of this chapter.

5.5 Examples of Good Practices of Adopting Technology in Pedagogy

An analysis of findings from the two case studies reveal some good practices that have been adopted in the HEI by applying technology in pedagogy prioritised according to the frequency of use.

a) Discussion boards and online community

Enabling an online community is one of the most common examples of good practice in applying technology in the pedagogy. This is achieved by enabling discussion boards where students can engage with the academic staff members and each other through text-based discussions. It is a key aspect of VLE implementation that is quite valuable when the text is concise or precise and can be amended before posting.

b) Use of social media

Another common good practice of applying technology in pedagogy is integrating with a VLE system social media (e.g. Twitter, Facebook, or Google Plus), which are considered as valuable tools for facilitating networking with people even after the completion of the course. This allows the academic staff members to reach students at any time using their preferable method.

c) Using audio in online teaching environment

Providing students with podcasts is one way of applying technology in pedagogy. The academic staff members can provide their feedback and comments on the students' coursework. The audio file gives inspirational as well as corrective comments.

d) Use of lecture recording or capturing

Another good practice example is recording or capturing the classroom lecture, which makes a big impact allowing students to revise their work before exams. This is especially helpful for the international students who may not be able to understand fully the lecture during the class and need to go back to it for understanding further. A lecture recording available on the VLE enables students to not only revise the entire lecture, but also skip to the specific portion of the lecture that they are interested in, thus saving their time.

e) Enabling integration of media in the VLE

Another example of good practice of using technology in learning is to allow students to make their own videos and audios and contribute in helping other students in creating materials. Moreover, students can develop materials for the academic staff members and work with them closely to deliver a piece of work that is valuable, especially for new students.

f) Synchronous access to learning resources

A good practice example of using technology in HEIs is by providing students with access (via the VLE system) to the academic staff members; for example by integrating Skype or Google Plus Hangout with the VLE system to enable synchronised tutorials. In conventional practices, most of the learning is asynchronous, in a sense that if a student posts the messages in the morning, the teacher might not read that message until the following day, which needs to be replaced by a synchronous style of learning where messages are read instantly and regular synchronisation sessions are conducted with all students, thus providing everyone an opportunity to participate.

g) Maintaining a personal learning journal

An aspect of applying technology in pedagogy is encouraging students to put the learning journal in a blog from day one when they join the course and continue that blog right through the day they graduate; it is like an e-portfolio where they can include pictures, their journey through the course, and reflection on their modules, thus enabling, empowering and encouraging students to make effective use of the wider tools that are available on the VLE system. This has been reported as quite useful for the students, because they can show such journey during interviews with their future employers or during their interview for a Masters course indicating what they have learnt and achieved. Their blog or learning journal could also demonstrate the quality of their work.

h) Managing references via VLE system

Another example of good practice of using technology in learning is the integration of reference management tools, such as RefWorks (Reichardt, 2010), with the VLE system in order for the students to track the referencing for each module and build their own reference lists (affective library resources). It is a kind of tagging the resources that are referred, which is quite important in online learning.

i) Creation virtual bookshelves by students in online library accounts

An example of applying technology in good practices is providing good access to the online library system where they get journals allowing quick searches enabling them to create virtual book shelves in their online accounts so they can utilise all resources on the reflective practice or action researches; moreover, they can categorise the papers they find on the online book shelves.

5.6 Key Benefits of VLE Implementation

An analysis of findings from both case studies show that the key benefits associated with a successful VLE implementation are:

- Facilitation of learning - another interface for the students to gain information and knowledge which can address different learning styles.
- Student’s satisfaction - good learning experience.
- Accessibility - obtain information from distance, thus expanding the circle of learners offering wider range of knowledge.

- Flexibility of learning – fully available at anytime, anywhere.
- Better engagement - from students and staff members.
- Enhanced feedback - immediate feedback from and to the students.
- Expansion of learning beyond classroom - something on-going or a real resource they can tap into.
- Improved communication - among staff members and students.
- Different learning schemes - providing more options for teachers.
- Interactivity levels - enabling peer-to-peer interactions, thus allowing a variety of exchanges in the learning process with different people and different institutions.
- Enhanced sharing of information - producing high quality learning material that can be shared through e-learning and e-resources.
- Courses become completely open to global market - using VLE effectively and producing more audio/video lectures; the university may use these lectures to produce and market online courses internationally like the MOOCs (Massive Open Online Courses), thus benefiting university's reputation and potential market sale.
- Up-to-date information.
- Students getting prepared for the workplace.
- Time saving for staff members - capturing or recording lectures for the next year.

The above benefits are prioritised according to their frequency of occurrence as reported in the data from the two case studies. Facilitation of learning and student satisfaction is the main focus for the various HEIs.

Staff perspective	*Student perspective*
• Availability and access from everywhere • Effective commutation with students • Electronic assessment facilities • Enrich student with different learning resources • Everything in one place • Faster and easy way to manage modules (more efficiently) • Help and flexibility to organise teaching activities (modules, coursework, marking) • It is a website to publish content on • Consistent interface to students • Professionalism	• Access from any place • Access to relevant and useful information • Easy and quick way to access course content • Access to training courses • Important announcements • Useful learning resources • Up to date with latest related to modules • Assignments • Ability to learn according to the needs • Facilitation of learning (mobile learn, uploading files) • Time saving • Track and catch up • Online submission and feedback • One place for everything • Discussion and communication between students themselves as well as the tutor • Availability of useful features to learn • Connect with tutors • Paperless environment

Table 5-17 Comparison of VLE Benefits from Student and Staff Perspectives

Table 5-17 shows more benefit to student than staff members. Accessibility is the main benefit to both parties, which is the ability to access from anywhere.

5.7 Future of E-Learning in HE

Findings show that 50% of the participants consider that mobile phones are the most promising key enablers for learning solutions, 33% consider social media, 22% podcast, 16% learning analytic tool, 11% MOOCS, and 5% virtual worlds. An analysis of findings from both case studies shows a huge expectation from students for the future of e-learning in HE; on the other hand, staff members' expectations on the future of e-learning in HE shows exponential growth, thus introducing more creativity. Future trends include blended learning, online higher education, mobile and work-based learning, educational games/simulations, and online peer-to-peer assessments. Another trend anticipated is more distance learning courses to adapt to the user requirements with simple tools, which can be used together by the academic staff members to build appropriate e-learning solutions. It has also been expected to have more monolithic, inflexible corporate offerings, which do as much to impede learning as to support it. Systems must be as sophisticated in their use as desktop applications. In terms of the interface design, a usable intuitive environment that acts and adheres to standard conventions of interaction acting like a regular browser is expected in the future. Table 5-18 presents the expected new forms of learning from the perspectives of students and staff members.

Staff perspective	*Student perspective*
Social learning will grow	More effective interactivity
Reactive classrooms where students have their own personal table devices	Coverage of more skills
E-assessments and more immediate feedback	More online assessment (e-assessment) and feedback (e-feedback), auto-marking assignments
More virtual reality set in specific subject environments	More virtual classes
Less structured teaching and face-to-face interaction	Decreased number of face-to-face lectures
E-learning will become a necessity; it will not replace face-to-face learning, but continue as a supplement	Will not replace face-to-face learning, but continue as a supplement
Online delivery, 100% distance learning	E-learning will become a necessity, heavily used and more up to date
Faster and easier to use	Ease of learning process
More broadcasting	Lectures will be live streaming and recorded
Usable intuitive environment	More intuitive
Blended learning and virtual learning	More books accessible online
Use of e-platforms for simulation and modelling	More data space
More virtual classes and gamified learning	Less papers and hard copy
More diffused and integrated environments	Continuity
Online collaborative learning via the social web	More use of cloud technology in e-learning
Virtual/flipped classrooms	Learning analytics

Table 5-18 New Forms of Learning from Staff and Student Perspectives

As illustrated in Table 5-18, findings indicate that e-learning will become a necessity in HEIs, where it will be used significantly with more up to date features and functionalities. Furthermore, it will be more effective in terms of communication between the academic staff members and the students leading to a limited number of traditional face-to-face lectures. Moreover, both key end-users, students and staff members highly emphasise that it should be a supplementary form of learning and not replace face-to-face learning. It will become ever more utilised, though it will never replace lecturing in totality. However, the university staff members and students need to be up-to-date with the technological advancements or they will be open to the risk of being out-dated and not as technologically advanced as rival institutions. Also, the visibility of cross-university research and the ability to share information with student groups in tutoring areas to support online studying groups offers another form of learning in future. Thus, findings from this research will help the HEIs to focus and meet some of these expectations, which will lead to enhanced user experience.

5.8 Conclusion

This chapter presents findings from the two case studies conducted at the national and local level HEIs. An analysis of findings highlights various aspects that need to be considered by the HEIs while undertaking a VLE implementation whether new or an upgrade. One of the most important aspects to consider is end-user involvement in terms of capturing end-user needs, enriching the awareness, and providing them with adequate training and support with different resources including more sophisticated technology, which can provide flexibility to the trainee. Moreover, brief training sessions promote self-learning using the Help Section on the VLE system, and encourage people to use the VLE system by themselves to learn. The end-users need to be educated about the new technology and the best way to utilize technology in teaching or pedagogical practices. Findings illustrate that the communication is a key between the implementation team, the schools, the academic staff members, and the students where eventually everyone gets updated information and understands what is happening and they are prepared accordingly. The good practices of VLE implementation suggest that HEIs need to set an engagement strategy that focuses on providing digital literacy to staff members and students in order to motivate academic staff members and students to engage in various e-learning activities. The involvement of stakeholders during the entire process of VLE implementation is certainly a supporting factor reported from the case studies. Taking into consideration minimum side effects on the end-user access to the system, the transition or upgrading process normally requires choosing a suitable time to conduct the upgrade. Since the majority of students have explicitly asked for personalisation in the VLE system, one of the good practices could be to offer more personalisation. Moreover, findings reveal that in line with the TEL strategy, HEIs establish dedicated centres to deal with e-learning implementation that are responsible for providing advice about pedagogy and the role of e-learning in digital literacy. Another important aspect of VLE implementation is enhancing user experience, which could be achieved by increasing awareness and getting the academic staff members and students to use it correctly. Also, for the staff members it is crucial to be able to adequately apply technologies in pedagogical practices.

An analysis of findings from both case studies, at the national and local levels, illustrates that VLE implementation consists of different stages and processes that could be explicitly linked to elements of the TEL strategy. Findings from this chapter assist in building the proposed comprehensive framework for VLE implementation, which is also aligned to the TEL strategy. These findings also facilitate the validation of the conceptual framework that was presented in Chapter 3. The proposed validated and refined framework is presented in Chapter 6.

Chapter 6: Proposed Framework for the VLE System Implementation

6.1 Introduction

The previous Chapter 5 presents findings from the case studies conducted in Higher Education Institutions (HEIs) for this research and mentions the key analytical tasks conducted in the two case studies. The findings presented in Chapter 5 helped to come up with a new proposed framework for the implementation of a VLE system in HEI. This is achieved by validating the conceptual framework presented in Chapter 3 against findings from the case studies and refining and enhancing it to establish a comprehensive framework for the VLE system implementation. This chapter proposes the comprehensive framework built out of good practices of VLE system implementation in HEIs; the key elements of the proposed framework are presented in detail such as various stages, process, CSFs, stakeholders, and challenges involved, and the interrelationship among the various elements. Moreover, this chapter demonstrates that the proposed framework is in line with the TEL strategy that was presented in Chapter 5. The proposed framework is built out of the good practices and it serves as a much easier tool for the HEIs to use. The HEIs could use the framework when they are in need of some assistance and advice. The framework will inform and facilitate the process of their VLE system implementation. The key elements of the VLE implementation framework are shown in Figure 6-1.

Figure 6-1 Key Elements of Each Stage in VLE System Implementation Framework

Figure 6-1 shows the key elements or building blocks of a VLE system implementation framework, which are VLE system implementation stages, processes, critical success factors (CSFs), challenges (CLGs) faced, the stakeholders (SHs) involved in each process, associated risks, and tools and technologies integrated in the VLE system. A *stage* in this research is referred to as a step in the VLE system implementation framework, and a *process* refers to a task performed in a specific stage of the VLE system implementation framework as a series of actions or steps taken in order to achieve a particular outcome. It is worth mentioning that each stage has multiple processes, specific CSFs, CLGs and stakeholders involved. Moreover, the stages and processes could be executed in parallel with other stages and processes respectively. The CSFs are the crucial aspects that need to be considered for the VLE system implementation to be successful. The CSFs are mainly guidelines or actions that need to be considered by the HEIs while implementing a VLE system; these are important elements associated with each stage or process of a VLE system implementation. CLGs are the difficulties faced in each stage or process of the VLE system implementation framework. SH are the people involved within a specific stage or process of the VLE system implementation framework. *Risks* in this research are referred to as the uncertain events that, if they occur, have a positive or negative effect on the prospects of achieving the VLE implementation project objectives.

6.2 Proposed Framework for the VLE System Implementation

The proposed framework for the VLE system implementation in HEIs is developed from the conceptual framework presented in Chapter 3, which is validated against the findings from the two case studies. The proposed framework consists of twelve stages and each stage contains various sequential processes, as shown in Figure 6-2. Some stages are executed in parallel with other stages; for example, it is considered as a good practice to execute Stage-9 Staff training in parallel with Stage-10 Final release and go live so that the academic staff members are well prepared in advance. Also, Stage-9 is parallel with Stage-5 as training provided to staff members before the pilot study. Also Stage-8 and Stage-10 are in parallel as migrating the data occurs before go live and the migration of course modules is conducted during and after the go live stage. It is worth mentioning that the risks associated with VLE system implementation permeate the entire framework, whereas the methods are associated with Stage-3, and the integrated tools and technologies are in Stage-7.

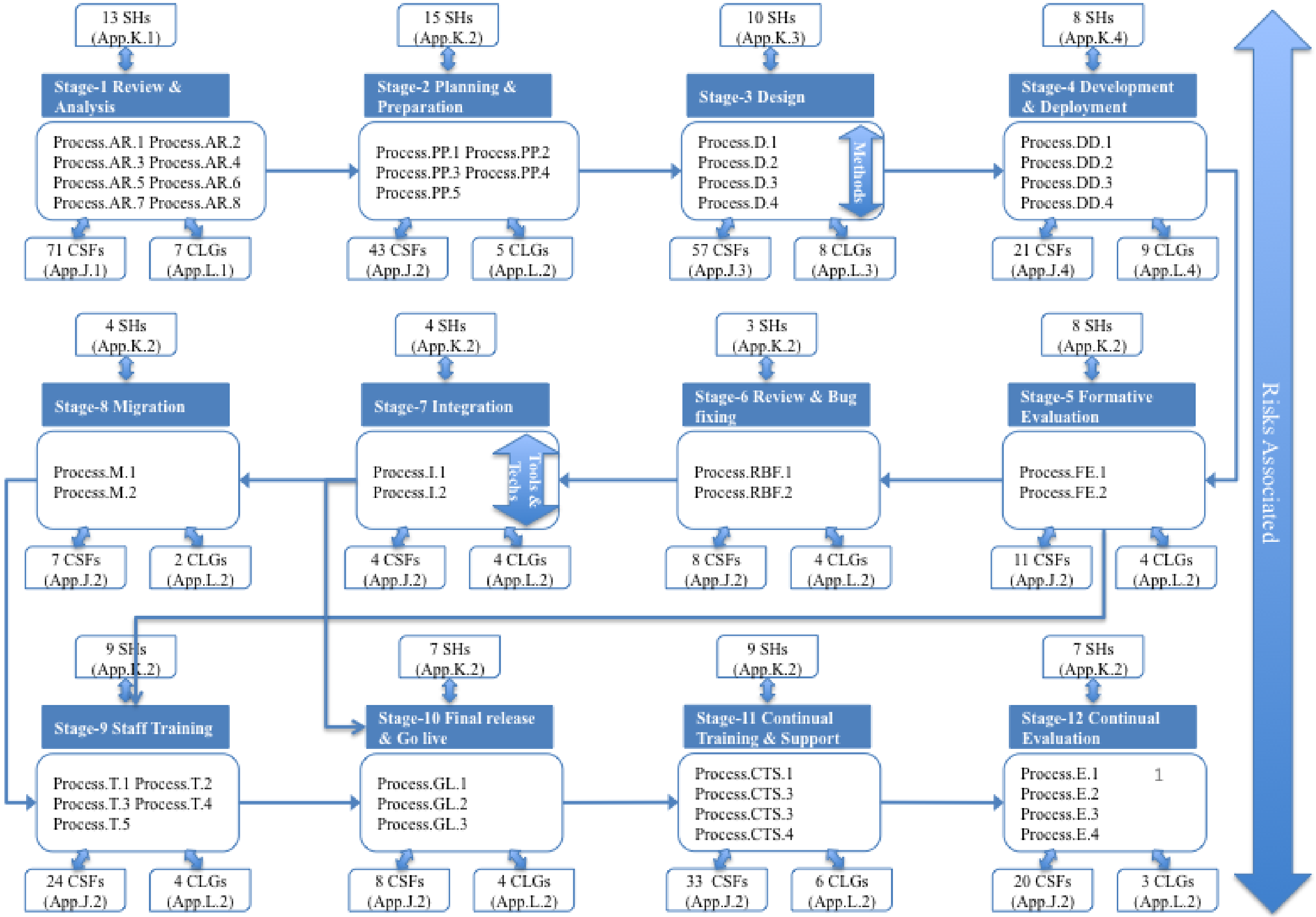

Figure 6-2 Proposed Good Practice Framework for VLE System Implementation

6.2.1 Stage-1 Analysis and Review (AR)

The VLE system implementation starts with analysis and review, this is the first stage of the proposed framework including nine processes and is the most lengthy among all others stages, as shown in Figure 6-2. Stage-1 deals with reviewing the current situation in a sense of figuring out where the institution stands. Most institutions consider conducting review and analysis at the beginning as a good practice; this review helps and leads the institution to build narrative and discourse about what a technology enhance learning should look like.

The importance of this stage is due to the impact of its output on the decision making, therefore it is considered as the most crucial stage of the proposed framework; however, the output from this stage greatly depends on the information provided, resources, and the accuracy of information gathered for the purpose of analysis which is essential for efficient technology utilisation, supporting partnerships, and for achieving the initiatives focused around improvements in HE. Therefore, the review stage could sometimes last for up to two years. Moreover, the results of this stage feed directly into Stage 2 - Planning and Preparation by answering some questions such as: Why is the institution implementing the VLE system, and is it needed? How is it going to improve efficiency or effectiveness? Is it going to transform anything? If so, is it for the better? and What exactly does the system do, and how is it going to work? Since the implementation of e-learning is still immature, there have to be valid reasons for changing. The analysis and review is a big stage, which consists of eight major processes, as shown in Table 6-1.

Process	*Sub-process*
Process AR.1 Define purpose and scope	Sub-process AR.1.1 Identify and involve related stakeholders
	Sub-process AR.1.2 Set-up SIG and WG
Process AR.2 Institutional analysis	Sub-process AR.2.1 Assess benefits
	Sub-process AR.2.2 Assess change implications
	Sub-process ar.2.3 Investigate into technological infrastructure
Process AR.3 Sector analysis	
Process AR.4 End-user analysis	Sub-process AR.4.1 Analyse students' needs
	Sub-process AR.4.2 Analyse staff members' needs and

Process	*Sub-process*
	technology awareness
Process AR.5 Define and prioritise the requirements	Sub-process AR.5.1 Define specifications and requirements
	Sub-process AR.5.2 Prioritise specifications and requirements
Process AR.6 Analysis and evaluation of potential solutions	Sub-process AR.6.1 Vendor analysis
	Sub-process AR.6.2 In-house solution analysis
Process AR.7 Develop business case	Sub-process AR.7.1. Conduct market research
	Sub-process AR.7.2 Generate analysis results and prepare reports
Process AR.8 Decision making	Sub-process AR.8.1 Involve related stakeholders
	Sub-process AR.8.2 Consider the overall model of learning
	Sub-process AR.8.3 Make choices based on the results in ar.7
	Sub-process AR.8.4 Demonstration of the chosen external vendor products

Table 6-1 Processes and Sub-Process in Stage-1 of the Proposed Framework

Table 6-1 presents various processes and sub-processes associated to Stage-1 of the proposed framework for VLE implementation, clearly showing that Process AR.8 is the most intense, having the maximum number of sub-processes. The main CLG faced in this stage is Stg-1.CLG.1 Decision to choose a VLE that fulfils the university's needs, a list of all the challenges faced in stage-1 are listed in Appendix L. There are several CSFs considered in Stage-1 of the proposed framework, however, few of those are overarching factors that have impact on the entire stage whereas others are specific to a process or sub-process in that stage listed in Appendix J. These overarching CSFs are shown in Figure 6-3.

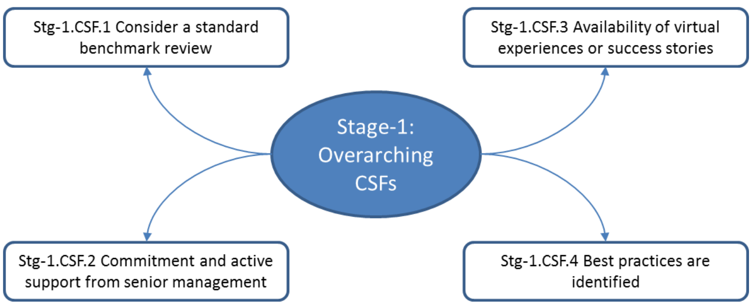

Figure 6-3 Stage-1 Overarching CSFs

Also, it is important to choose the right people for conducting the analysis and review; especially people having past experiences of e-learning implementation of some sort could help in this stage. Appendix K shows the list of various related stakeholders that need to be involved in Stage-1. The following sub-sections detail various processes and sub-processes of the proposed framework for VLE system implementation.

6.2.1.1 Process AR.1 Define Purpose and Scope

The Stage-1 Analysis and review starts with defining the purpose and scope of the VLE system implementation (Process AR.1, as shown in Table 6-1). This process refers to defining an institution’s purpose for implementing a VLE system and specifying the scope of implementation. Starting with a strategic framework then moving on to who are the main stakeholders and their influences on the success of the VLE system and then into what their priorities, which let down to the VLE choice. All the CSFs related to this process are listed in Appendix J, where the two CSFs (Stg-1.PR AR.1.CSF.1 Clear purpose and scope; and PR AR.1.CSF.2 Consider enhancing student experience and learning opportunities) are of key importance to the overall process. The process AR.1 has two sub-processes: AR.1.1 Identify and involve stakeholders; and AR.1.2 Set-up SIG and WG, which are detailed as follows:

Sub-Process AR.1.1 Identify and involve related stakeholders

While defining the purpose and scope, it is imperative to involve stakeholders as some crucial decisions about the VLE system are made before the planning and preparation stage (Stage-2) and different stakeholders should be involved in this process to obtain a variety of opinions. The proposed framework suggests the involvement of different, related stakeholders, in different processes and sub-processes, as shown in Appendix K. All CSFs related to this sub-process are listed in Appendix J where the key CSF is Stg-1.Sub-PR-AR.1.1.CSF.1 Consult with different stakeholders.

After identifying the related stakeholders, the next step is to then set-up a Special Interest Group (SIG) and Working Group (WG) in sub-process AR.1.2.

Sub-Process AR.1.2 Set-up SIG and WG

The SIG is a community within the university with a shared interest in advancing the TEL in the university with a main focus on enhanced student learning experience. The SIG members cooperate to affect or to produce solutions, and they communicate, meet, and organize focus groups (in line with Process AR.6 Analysis and evaluation of potential solutions). The WG is a committee appointed to study and report on a particular question and to make recommendations based on its findings, it should be academic-led group, alliance staff members from all different disciplines within the university, and some of the key users or key advocates of e-learning within the university. It is very crucial that the academic staff members are involved right from the very early stages of the VLE system implementation, as mentioned in Chapter 5, as a good practice and requirement of the TEL strategy. The first question to consider is whether the university actually needs VLE. In order to answer this question, the institution needs to conduct a wider survey of skills and needs across all the university staff members, and from that look at the staff competency and their needs in terms of online learning. Moreover, it is important to not just go with what people perceive they knew within the limitation of the system they know, but to try to know more about what the future of e-learning would likely be in the university. All CSFs related to this sub-process are listed in Appendix J, where the main CSF is Stg-1.Sub-PR-AR.1.2.CSF.1 Hold a series of workshops, focus groups, surveys and consultations with related stakeholders.

After defining the purpose and scope of the VLE system implementation, the next Process A.2 is analysing the internal situation of the HEI in detail.

6.2.1.2 Process AR.2 Institutional Analysis

This is the second process of Stage-1 Analysis and review and is conducted as a requirement from the TEL strategy (TEL.1 Review and analysis, as mentioned in Chapter 5) in terms of defining the vision, mission, and policy of the institution. The CSFs related to this process are listed in Appendix J, where the factor Stg-1.PR-AR.2.CSF.1 Institutional analysis is inline or supports the vision, mission, and policy of the institution is the key. Institutional analysis is inline or supports the vision, mission, and policy of the institution. This is of key importance to the overall process. It has been considered as a good practice that universities conduct institutional analysis and provide a high quality information and support for decision making, planning, and reporting in a timely manner. The accuracy of data is essential for efficient technology utilisation and for supporting partnerships and initiatives focused around HE improvements. The institution need a system that support their needs therefore conducting an institutional analysis in the VLE implementation framework appears as an important process because that provides a baseline about the current situation and a knowhow of where it is going towards. In order to analyse the internal situation of an HEI some questions need to be looked at, for example what are the institution's needs? How many people will be using the VLE system? Does the VLE system work with the IT infrastructure that institution has? Does the institution have people inside who can provide training to other people? What is the demand and need for online course and in which subject? The HEI has to ensure that they can support the e-learning and have all the adequate resource to support it. The process AR.2 has three sub-processes: AR.2.1 Assess benefits; AR.2.2 Assess change implications; and A.2.3. Investigate into technological infrastructure, which are detailed as follows:

Sub-Process AR.2.1 Assess benefits

The proposed VLE system implementation framework suggests to assess benefit and evaluate the benefit of implementing the VLE system on institution, students, and staff members such as reaching out to various people, advantages of addressing the accessibility issue (a comprehensive list of benefits are reported in Chapter 5). The main CSF related to this sub-process is Stg-1.Sub-PR-AR.2.1.CSF.1 assess the actual benefits of implementing VLE, as shown in Appendix J.

Sub-Process AR.2.2 Assess change implications

During the VLE system implementation it is important to assess the change implication and work on change management because it is not just a matter of creating a technology and using it but has a lot to do with the organisational change and the change of practice of going along with training people to use it and implementing itself. The main challenge in the organisation change is the resistance from users, which is usually expected; the TEL strategy presented in Chapter 5 contains some elements that show the importance of involving students and academic staff members in the process of VLE system implementation which helps in reducing the resistance. A detailed assessment of various change implications facilitate in dealing with VLE system implementation risks. All CSFs related to this sub-process are listed in Appendix J, where Stg-1.Sub-PR-AR.2.2.CSF.1 Consider organisational, cultural, and employee attitude is considered as the most crucial CSF in this sub-process.

Sub-Process AR.2.3 Investigate into technological infrastructure

The proposed framework suggests an investigation into the technological infrastructure as a sub-process within the institutional analysis. This sub-process helps to clarify the IT resources needed such as hardware, software, networks bandwidth Wi-Fi availability and other IT equipment for a successful VLE implementation. All CSFs related to this sub-process are listed in Appendix J, where Stg-1.Sub-PR-AR.2.3.CSF.1 Consider capable infrastructure is the most crucial CSF.

6.2.1.3 Process AR.3 Sector Analysis

This is the third process of Stage-1 Analysis and Review and the proposed framework suggests also conducting sector analysis in order to get an idea about TEL in other universities and more specifically the VLE system they are using. This process involves competitor analysis to understand what else is going on in other universities. It helps in establishing a list of technologies that are adopted worldwide, for example if the technologies are being used by several countries and universities. Conducting such sector analysis enables the HEI to embrace what is available out there and if it is good and compatible with the system they have and meet the needs of the students who embrace it. Moreover, this sub-process involves investigating into various good practices across other universities, thus helping the university to decide which system is more suitable. All CSFs related to this sub-process are listed in Appendix J, where Stg-1.PR-AR.3-CSF Investigate into good practices across other universities is the key factor. After performing sector analysis, the next Process AR.4 is to perform the end-user analysis in detail.

6.2.1.4 Process AR.4 End-User Analysis

This is the fourth process of Stage-1 Analysis and review. The proposed framework for VLE system implementation suggests investigating into end-user needs through conducting technology awareness and needs analysis. This sub-process reveals which user needs must be met and how to best fulfil them. Moreover, it is imperative to assess the actual benefits of the VLE system implementation to the end-users. The end-users are those who actually use the VLE system: mainly students, academic staff members, other users (including course administrators) and learning technology facilitators. All CSFs related to this sub-process are listed in Appendix J, where Stg-1.PR-AR.4-CSF.1 Consider all end-user communities to review the VLE is the most crucial CSF. The process AR.4 has two sub-processes: AR.4.1 Analyse students' needs; and AR.4.2 Analyse staff member's needs and their technology awareness, which are detailed as follows:

Sub-Process AR.4.1 Analyse students' needs

The proposed framework for VLE system implementation suggests performing learner identification and analysis, including student needs. The student needs should be considered by the academic staff members while designing a course and in pedagogical practice. The feedback obtained by the students help to implement interaction activities for the students. A comprehensive list of difficulties and limitations faced by students is mentioned in Chapter 5; these should be considered in order to meet the student needs. A detailed analysis of the students' needs will lead to student satisfaction, and will enhance student interaction with the VLE system, thus enhancing the learning experience. While performing this sub-process, it is imperative to test or evaluate user needs or requirements, which is a CSF of this sub-process as mentioned in Appendix J.

Sub-Process AR.4.2 Analyse staff members' needs and technology awareness

In addition to performing analysis of student's needs, it is also important to perform instructor analysis in term of their technology awareness to help the institution in taking actions if technology awareness of the staff members is low, for example, as mentioned in Chapter 5 consider digital literacy (TEL.4). Educating the staff members and students and fostering their understanding about using the new technology will help in enhancing efficiency and effective use of the VLE system. The proposed framework suggests that the analysis should be conducted before defining the requirements.

After conducting the end-user analysis for the academic staff members and student, the next Process AR.5 is defining and prioritising the requirements gathered by the academic staff members and students.

6.2.1.5 Process AR.5 Define and Prioritise the Requirements

This is the fifth process of Stage-1 Analysis and review to define and prioritise the requirements for the VLE system that includes all sorts of functionalities people may want from the VLE system. It is a crucial process of the proposed framework because defining and prioritising the requirements adequately has a major impact on the successful VLE implementation. A comprehensive list of the functional and non-functional requirements is presented in Chapter 5. Here, Stg-1.PR-AR.5.CSF.1 communication with all related stakeholders is a key factor, as listed in Appendix J. The process AR.5 has two sub-processes: AR.5.1 Define specifications and requirements; and AR.5.2 Prioritise specifications and requirements, which are detailed as follows:

Sub-Process AR.5.1 Define specifications and requirements

In this sub-process, the HEI should define the specifications and the requirements for the VLE system by gathering them from all the stakeholders involving the academic staff members and the students, as they are considered to be the main users of the VLE system (from the results in Chapter 5). It has been reported as a good practice to gather the requirements through staff members' and students' focus groups. The requirement and specifications are listed based on the responses from different stakeholders involved in the focus groups; once the requirements are gathered they are then grouped into different categories. Moreover, both functional and non-functional requirements should be gathered from the users. All CSFs related to this sub-process are listed in Appendix J, where Stg-1.PR-A.5.1-

CSF.1 Conduct focus groups with students and academic staff members is a key factor.

Sub-Process AR.5.2 Prioritise specifications and requirements

After gathering the requirements, they need to be prioritised by involving various stakeholders in the faculties; for prioritisation, the MOSCOW (i.e. must have, should have, could have, and would have) scheme (Hatton, 2008) could be adopted. Various e-learning groups within their faculties should be consulted to discuss the prioritisation of requirements. It is imperative to ensure that adequate requirements are captured and then ranked. Also, the requirements that are no longer essential are listed because specifications that are requested by students are not considered as important by the staff members and vice versa.

The output from this exercise would be a massive list of detailed specifications, which can then be used as a part of documentation that the HEI provides to the VLE system vendors depending on what they want to achieve; this includes a list of various features required in a VLE system. The prioritisation of requirements should be conducted before the decision is made because following that the planning and preparation stage starts. The key CSF in this sub-process is Stg-1.Sub-PR-AR.5.2.CSF.1 Adequate ranking of the requirements. The main challenge faced during this sub-process is: Sub-PR-AR.5.2.CLG Prioritise the most important things. After gathering and prioritising the requirements, it is imperative to evaluate the potential solutions against the requirements, which is conducted in process AR.6.

6.2.1.6 Process AR.6 Analysis and Evaluation of Potential Solutions

This is the sixth process of Stage-1 Analysis and Review, where the HEI evaluates the potential solutions and studies various possibilities based on the requirements defined in process AR.5. The key selection criterion is that the VLE system enables integration to any other system or tool. This process will help to narrow the scope for the decision makers in process AR.8 Decision making. Here, the most crucial CSF is Stg-1.PR-AR.6.CSF evaluates the potential solutions against the requirements, which is mentioned in Appendix J. In order to analyse and evaluate the potential solution, it is imperative to analyse the pedagogical choices, and vendor or in-house solutions. The process AR.6 has two sub-processes: AR.6.1 Vendor analysis; and AR.6.2 In-house solution analysis, which are detailed as follows:

Sub-Process AR.6.1 Vendor analysis

During vendor analysis, the HEIs need to review different VLE systems, such as Blackboard and Moodle, and then assess what is best for them. This sub-process includes: 1) looking for different VLEs and their functions and their affordability; 2) inviting people from different communities and different bodies to examine different possibilities, for instance, in case of open source environment, invite people from other universities using such open source environments to attend and demonstrate the system and discuss their experiences that might lead to the choice of a particular most appropriate environment; 3) looking for the advantages and disadvantages of having an open source or commercial product or any off-the-shelve system. The key CSF in this sub-process is Stg-1.Sub-PR-AR.6.1.CSF Consider functional and non-functional requirements defined in process AR.5.

Sub-Process AR.6.2 In-house solutions analysis

In this sub-process, the HEI considers its capability and the possibilities of building the VLE system in-house, which has a very low probability considering the enormous efforts and the extended number of resources that are required for developing an in-house VLE solution. Therefore, most HEIs do not go through this route. A key CSF considered during this sub-process is Stg-1.Sub-PR-AR.6.2.CSF Consider skills on sight to do the development work.

6.2.1.7 Process AR.7 Develop Business Case

This is the seventh process of Stage-1 Analysis and Review, where the business case is developed to rationalise the proposed VLE system implementation project. The business case should cover the estimated cost of VLE system implementation and the cost of supporting a change in practice and its sustainability; it also includes cost/benefit analysis, estimated time for development, risks involved, essential requirements, and resources needed. Business models could be used to identify possible threats or a SWOT analysis could be used to determine strengths, weaknesses, opportunities and threats. Furthermore, HEIs should consider integrating business planning and TEL strategies. Consequently, the HEI can make decisions about the most suitable VLE system (decision making is mentioned in Process-AR.8). All CSFs related to this process are listed in Appendix J, where the CSF Stg-1.PR-AR.7.CSF.1 Conduct cost benefit analysis is the most important. The process AR.7 has two sub-processes: AR.7.1 Conduct market research; and AR.7.2 Generate analyses results and prepare reports, which are detailed as follows:

Sub-Process AR.7.1 Conduct market research

This is part of the overall TEL strategy working toward sustainability to conduct a market research, which will help to support the HEI financially. An effective market research is imperative to get the most out of this sub-process. An important CSF is Stg-1.Sub-PR AR.7.1CSF.1 Consider sustainability, as listed in Appendix J.

Sub-Process AR.7.2 Generate analysis results and prepare reports

The proposed framework suggests generating the result of analysis in the form of reports based on the overall analysis conducted in Stage-1 Analysis and Review. These results and reports will assist the decision makers in process AR.8 to make the right decision based on the data generated. It is crucial to ensure that the data are accurate, which will affect the results and subsequently the decisions made. Therefore, the main CSF for this sub-process is Stg-1.Sub-PR- AR.7.2.CSF Accuracy of information generated, as mentioned in Appendix J.

6.2.1.8 Process AR.8 Decision Making

This is the eighth and final process of Stage-1 Analysis and Review, where decisions are made based on the analysis conducted in all previous processes considering comparisons in various dimensions. Process AR.8 is one of the most important processes of Stage-1, as the key decisions are made here that will affect the entire VLE system implementation and the following stages of the proposed framework. Therefore, it is necessary to involve the related stakeholders, taking in to consideration all the important factors and make choices based on the results from the previous processes. The main challenges faced during this process are:

PR-AR.8.CLG.1 Financially constrained; PR-AR.8.CLG.2 Cope with the sector; and PR-AR.8.CLG.3 Get the right people.

All CSFs related to this process are listed in Appendix J, where the CSF Stg-1.Sup-PR-AR.8.1.CSF Involve the stakeholders (mentioned in Appendix K for Process AR.8) is the most important. The process AR.8 has four sub-processes: AR.8.1 Involve related stakeholders; AR.8.2 Consider the overall model of learning; AR.8.3 Make choices based on the results in AR.7; and AR.8.4 Demonstration of the chosen external vendor products, which are detailed as follows:

Sub-Process AR.8.1 Involve related stakeholders

Since decision making is an essential process, the proposed framework for VLE system implementation suggests involving the key related stakeholders that somehow impact or are responsible for making the decisions; these could include: senior management group, academic development unit, academic staff members, e-learning specialists, top management and strategic unit. A comprehensive list of all the stakeholders that should be involved in decision-making is presented in Appendix K.

Sub-Process AR.8.2 Consider the overall model of learning

It is also required to consider the overall model of learning, whether the HEI requires blended learning or pure online learning in order to make the right decision regarding the VLE system implementation. This is based on the institution’s TEL strategy, since it is a requirement in TEL.2 Implementation of e-learning systems (such as VLE).

Sub-Process AR.8.3 Make choices based on the results in AR.7

This sub-process is about VLE -related decision making to fulfil the needs of the HEI. The proposed framework advocates making choices based on the results generated in AR.7 with regards to the following considerations:

- Choose to upgrade existing system or get new system
- Choose in-house or external vendor product

- Choose open-source or commercial product (if external vendor is chosen)

All CSFs related to this process are listed in Appendix J, where the CSF Stg-1.Sup-PR-AR.8.3. CSF.1 cost-effective and sustainable VLE is the most important.

Sub-Process AR.8.4 Demonstration of the chosen external vendor products

The proposed framework suggests conducting a demonstration of the chosen external vendor product. This is through consulting suppliers to explore how technology could support learning, invite different commercial vendor product providers to present and discuss with other stakeholders about their product and how it meets their needs and fulfil their requirement or invite people from other universities that are already using Open Source product to share their experience. All CSFs related to this process are listed in Appendix J, where the CSF Stg-1.Sup-PR-AR.8.4.CSF.1 Consider maturity or stability of technology chosen is the most important. By the end of this process, a final decision should be made and the HEI should be clear about what type of VLE system they are going to implement, which will initiates the commencement of Stage-2 Planning and Preparation.

6.2.2 Stage-2 Planning and Preparation (PP)

After conducting the review and analysis the next stage is to plan and prepare for the VLE system implementation. Stage-2 comprises seven processes and has gained importance as one of the crucial steps in the life cycle of the VLE implementation. Although the analysis stage will help to review the planning and preparation stage, inadequate planning could negatively impact the project. Appropriate planning and preparation need to be conducted strategically in the long, medium, or short term. The VLE system implementation plan and objectives set the architecture for the entire project. The planning and preparation stage is also a lengthy stage, as can be seen in Table 6-2.

Process	*Sub-process*
Process PP.1 identify a clear set of objectives	
Process PP.2 identify and involve related stakeholders	
Process PP.3 prepare schedule and project initiation documents	Sub-process PP.3.1 assign roles, including project manager and teams
	Sub-process PP.3.2 set a time line
	Sub-process PP.3.3 conduct risk analysis
Process PP.4 consult with external supporting body	
Process PP.5 arrangement and announcement	

Table 6-2 Processes and Sub-Process in Stage-2 of the Proposed Framework

Table 6-2 presents the various processes and sub-process associated with Stage 2 of the proposed framework for VLE implementation, clearly showing that Process pp.3 is the most crucial having certain critical tasks or sub-processes. There are several CSFs considered in Stage 2 of the proposed framework. A few of those are overarching factors that have an impact on the entire stage, whereas others are specific to a process or sub-process in that stage. These overarching CSFs are shown in Figure 6-4, where the key CSF is support from top management.

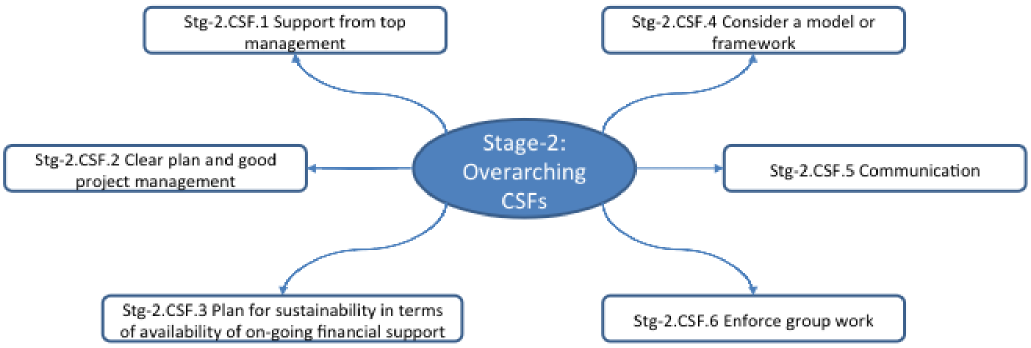

Figure 6-4 Stage-2 Overarching CSFs

The main challenge faced during this process is Stg-2.CLG-1 Evaluating existing VLEs' implementation experiences and determining critical success factors. A list of all the challenges faced in Stage 2 are listed in Appendix L, and Appendix K shows a mapping to various stakeholders related to and involved in Stage-2.

6.2.2.1 Process PP.1 Identify Clear Set of Objectives

This is the first process of Stage-2 Planning and preparation, where a clear set of objectives are identified for the VLE system implementation project, which should cover all the implementation aspects and lead to full implementation of the VLE system. There has to be clear set of objectives and an agreement of what the project wants to achieve. These objectives should not contrast with the organisational policies and be in line with the decision(s) made in process AR.8.

6.2.2.2 Process PP.2 Identify and Involve Related Stakeholders

This is the second process of Stage-2 Planning and preparation, where project champions are allocated to involve related stakeholders. A comprehensive list of all the key stakeholders that should be involved in decision making is presented in Appendix K. It is important to ensure collective responsibility and shared interests to achieve the expected outcomes. Since the creation, utilisation, and support of e-learning facilities require balance among various technical, organisational and pedagogical considerations across the entire HEI, as reported in Chapter 2. Therefore, four project boards are highlighted in the proposed framework: advisory board, project board, steering board, and pedagogical or academic board. In this process, the most important CSF is Stg-2.PR-PP.2.CSF.1 Top management support.

6.2.2.3 Process PP.3 Prepare Schedule and Project Initiation Documents

This is the third process of Stage 2 Planning and preparation, where after identifying the objectives and consulting related stakeholders, the VLE team should prepare a schedule for the VLE system implementation. The planning should also cover the post-implementation schedule, such as evaluation, integration, and training. Planning in advance needs to be clear and ensure that everyone is clear about what should be done and how. Moreover, it is useful to have an initial plan that could be altered slightly along the way based on change in timings or people’s availability. The plan should also cover a periodic update cycle for the VLE system, hardware acquisition and setting up the pilot and so on.

All CSFs related to this process are listed in Appendix J, where the CSF Stg-2.PR-PP.3.CSF.1 Clear plan is the most important. The process PP.3 has three sub-processes: PP.3.1 Assign roles including project manager and teams; PP.3.2 Set a time line; and PP.3.3 Conduct risk analysis, which are detailed as follows:

Sub-Process PP.3.1 Assign roles including project management teams

The proposed framework suggests assignment of roles and responsibilities; this includes assigning the project manager and setting up various teams that are going to be involved in the VLE system implementation project. The various teams include: technical team, training team, and pedagogic team. The VLE system implementation teams are set-up to supervise and manage the rollout of the VLE system and to run the pilot study.

Assigning project manager- The most significant task is to assign a project manager before starting the VLE system implementation planning, as the project manager should lead the creation of the teams and manage the entire project. Therefore, it is crucial to choose the right person to lead the project, who has qualified project management experience and the ability to maintain good relationships with all parties.

Assigning project teams- A crucial task for the project manager is to assign the project teams. This involves the setting up of various teams who will be involved in the VLE system implementation project, including the technical, training and pedagogical teams. It is imperative to involve the ‘right’ people from each academic school or department, such as academics and people having past experience in e-learning implementation, who can help in the overall planning for the VLE system implementation and in course design. Creating and assembling such a team could lead to the transition to the new environment from the previous one. Here Stg-2.Sup-PR-PP.3.1.CSF.1 Champion with clear vision and strong leadership is a key CSF, as mentioned in Appendix J. The VLE project team is mainly university-based, but it could also collaborate with an external body or support body. The following three teams need to be assigned:

*Technical team***-** The technical team mainly consists of developers responsible for maintaining the VLE system codebase, developing the VLE plug-ins, or customising themes. They take care of the VLE system upgrades, tweaking and maintenance, such as the VLE server side and database administration. Moreover, the technical team involves end-user technical support to students and academic staff members for the day-to-day use and course level administration tasks, such as assignment submissions, grading, and course backups.

Training team- The training team is responsible for training in Stages 9 and 11 in order to conduct the training programs for empowering academic staff members, course managers and students. These programmes contain training activities with students and staff members, including staff members' development.

Pedagogical team- This team consists of teaching experts responsible for the pedagogical aspects of the VLE system implementation. The approach generally focuses on ensuring that recognition is given to the academic staff members and experts in teaching to let them drive and complete the implementation process and making sure that the academic staff members had input into decisions and on the basis of advice provided about pedagogy which is suited to different means of e-learning and to apply technology into various pedagogical practices.

Sub-Process PP.3.2 Set a timeline

The proposed VLE system implementation framework suggests that after preparing a schedule and the project initiation document, the team needs to set a timeline as part of the planning and preparation stage. It is important for different stakeholders to be aware of the time when the pilot study will be run and when the system will be live. The usual timescale for the pilot is one year. The crucial success factor is Stg-2.Sup-PR-PP.3.2.CSF.1 Determination of the completion date for the development work (as mentioned in Appendix J).

Sub-Process PP.3.3 Conduct risk analysis

The proposed framework advises deploying risk analysis to identify factors that may risk the accomplishment of the VLE project and to achieve its goal. Although risk analysis should be on-going throughout the entire project, it is particularly important in the preparation and planning stage. Conducting risk analysis is crucial because in this way one could find out about what the system is capable of, what could possibly go wrong, what the data is like - these kind of things need to be built into the planning of the VLE system implementation. Risk analysis includes establishing a risk register which is updated regularly by the VLE project team. This should also include a rollback plan - if something goes wrong then the system will be rolled back to avoid any issues. Moreover, it is suggested that around two or three weeks mitigation time should be allowed; if something goes wrong then the team has time to fix it. The refined list of the key risks involved in VLE implementation is presented in Appendix M.

6.2.2.4 Process PP.4 Consult with External Supporting Body

This is the fourth process of Stage-2 Planning and preparation, where external supporting bodies are consulted in planning and preparation for the VLE implementation. Examples of supporting bodies that are reported in Chapter 5 include: HEFCE, JISC, commercial vendor product provider, and other universities with experience of VLE implementation that may work as supporting bodies for other universities. They work as consultants and provide support during the VLE system implementation process; also they provide advice in using digital technology for the educational purposes. An important CSF for this process is participation and regular interactions with external bodies, as mentioned in Appendix J.

6.2.2.5 Process PP.5 Arrangement and Announcement

This is the fifth process of Stage-2 Planning and preparation, where based on the schedule and the timeline of VLE system implementation, an announcement and arrangement is made internally to inform everybody on what is going on and what they should expected to have in the few coming months. This process is needed to prepare the staff members and students for the change as well as having their cooperation as a community to successfully complete the VLE implementation. This process is also activated in the periodic upgrade of the VLE system; there should be a plan and notification for the users to ensure that all different teams are involved, so that the change or upgrade does not overly affect the users. It is worth mentioning that Stage-1 and Stage-2 of the proposed framework underpin all other stages of the VLE system implementation. If these are properly conducted, then everything else follows through to the evaluation, and if there are limitations or drawbacks in the results or decisions made in these stages, these would impact on all the other stages and hence on the overall VLE system implementation.

6.2.3 Stage-3 Design (D)

After conducting the planning and preparation stage, the next stage is designing the VLE system implementation. Stage-3 comprises four processes covering different types of design depending on the type of VLE system chosen in the previous stages. It covers the actual system design if the system is built in-house, design interfaces, design iteration, course design, and content development. The importance of this design stage comes from the fact that it shows the appearance and functions of the VLE system before it is actually implemented. This stage consists of four processes as mentioned in Table 6-3.

Process	*Sub-process*
Process D.1 course design and content development	Sub-process D.1.1 establish learning and teaching unit Sub-process D.1.2 design course structure Sub-process D.1.3 analyse pedagogical choices Sub-process D.1.4 authoring course contents Sub-process D.1.5 review and edit content Sub-process D.1.6 deliver presentation
Process D.2 system design for in-house product only	
Process D.3 interface design	
Process D.4 design iteration	

Table 6-3 Processes and Sub-Process in Stage-3 of the Proposed Framework

Table 6-3 presents various processes and sub-process associated with Stage-3 of the proposed framework for VLE system implementation, clearly showing that the design stage also covers course design and content development (Process D.1), which is the most intensive and crucial process containing the critical tasks or sub-processes. A comprehensive list of all the CSFs related to this stage is listed in Appendix J. Furthermore, Appendix K shows the list of various related stakeholders that need to be involved in Stage-3. The main challenge faced in this stage is Stg.3.CLG.1 Accessibility issues, where all challenges faced are listed in Appendix L.

6.2.3.1 Process D.1 Course Design and Content Development

This is the first process of Stage-3 Design. In the course design, the learning objectives are set; it also includes development of course material choosing media applications, planning evaluation, and preparing instructional strategies in advance. Course design is mainly done by the academic staff members themselves, as each subject has specific needs; however, ready to use design templates are recommended to help the academic staff members in designing their courses. This process also involves creating and putting in place some curriculum design ready for the academic staff members to use because it is needed to have such designs in place and provide the academic staff members with an opportunity to choose the one that is appropriate for their unit. It is understandable that quite often different disciplines and different subjects have different needs, so it is imperative to offer choice to the academic staff members. A major challenge in course design is that different subjects have different e-learning needs (as mentioned in Appendix L). In order to improve course design and course content to accomplish the requirement for the VLE in distance learning/pure online learning, the proposed framework suggests that HEIs consider focussing more on the quality of each course and the quality of the content especially in the case of limited face-to-face learning. All CSFs related to this process are listed in Appendix J, where the most important CSF is Stg-3.PR-D.1.CSF.1 Adequate staff members training is provided for course design. The process D.1 has six sub-processes, which are detailed as follows:

Sub-Process D.1.1 Establish learning and teaching unit

The proposed framework suggests to encompass the development of all courses within the VLE system, so it is recommended that the individual academic staff members are not solely responsible for uploading materials on the VLE system or editing it; this is one of the core responsibilities of the learning and teaching unit. However, the course material is developed and reviewed by a module team of academic staff members, before it is submitted to the unit. Furthermore, it is important that one of the members of the course design unit is part of the module team in order to provide advice in developing the material and to get the academic staff members' feedback regarding the course design. This way will guarantee higher quality and professional course design, which will accomplish the requirements for a successful VLE system implementation. Moreover, this unit is in-line with TEL.9 Innovation in terms of innovating educational technologies and including innovation in terms of the latest pedagogical development and practices. The main CSF in this sub-process is Stg-3.Sup-PR-D.1.1.CSF.1 Connect with the VLE team.

Sub-Process D.1.2 Design course structure

Part of designing the course is "considering the structure", i.e. looking for an appropriate structure for the course including how the course will be run, the assessment tasks, the activities provided to the students, and how the students are going to use the course. The main CSF of this sub-process is being keen on a constructive approach, discussing and debating ideas and received feedback (as mentioned in Appendix J).

Sub-Process D.1.3 Analyse pedagogical choices

The proposed framework suggests analysing the pedagogical choices at the institutional level, which mainly focuses on the delivery methods, assessment and development strategy of using TEL. However, the course-level pedagogical choices in terms of selecting and developing pedagogic model or instructional design strategy can be different from subject to subject and can be applied by the academic staff members in their teaching practices through applying technologies in pedagogical practices (as mentioned in TEL.5 in Chapter 5).

Sub-Process D.1.4 Authoring course contents

After "designing and structuring the course", the proposed framework includes development of the course material. Authoring the course content is the responsibility of the academic staff members. With authoring on-line course content, some challenges could be faced, most importantly that of intellectual property rights (as listed in Appendix L). All CSFs related to this sub-process are listed in Appendix J, where the main CSF of this sub-process is Stg-3.Sub-PR.D.1.4.CSF.1 Interesting material or motivational content.

Sub-Process D.1.5 Review and edit content

According to the proposed framework, “reviewing and editing the content” should be done separately after “authoring the content”. This sub-process should be conducted by a team of academics working jointly to critically review the content. It is an extensive peer review of the contents to be loaded on the VLE system. The main CSF in this sub-process is Stg-3.Sub-PR.D.1.5.CSF.1 Consider group of academics to review the content.

Sub-Process D.1.6 Deliver presentation

In this sub-process, the course content is presented and uploaded to the VLE system website. The main challenge here is to manage the complexity of the resources (as listed in Appendix L). All CSFs related to this sub-process are listed in Appendix J, where the main CSF of this sub-process is Stg-3.Sub-PR.D.1.6.CSF.1 Compatible with the university policies.

6.2.3.2 Process D.2 System Design for In-house Product Only

This is the second process of Stage-3 Design, where the system is designed according to the end-user’s requirements. The functionality and how the system is built-in and integrated with other systems in the HEI is crucial, and it is based on the functional requirements gathered in process AR.5. A comprehensive list of the functional and non-functional requirements is presented in Chapter 5. The importance of this process is that if the system is adequately designed then the user will find it easy to use and not much training will be needed. The main CSF for in-house system design is Stg-3.PR-D.2.CSF.1 Ability to integrate with other systems, technologies and tool (as mentioned in Appendix J).

6.2.3.3 Process D.3 Interface Design

This is the third process of Stage-3 Design, where the interfaces are designed if the VLE system is an in-house system; however, if the VLE system is an external vendor product, the HEI has the opportunity to customise and modify it, but only with limited flexibility in the commercial products. It is crucial for the VLE system implementation to have clear, simple, flexible, and attractive interfaces that will help in improving the acceptance of the VLE system among various users. The key challenge here is user likeness or acceptance (as listed in Appendix

L). All CSFs related to this sub-process are listed in Appendix J, where the main CSF of this sub-process is Stg-3.PR-D.3.CSF.1 Ease of use and user friendliness.

6.2.3.4 Process D.4 Design Iteration

This is the fourth process of Stage-3 Design; it is about the design methodology based on a cyclic process of prototyping and refining the design of the VLE system. All changes and refinements are made based on the results of testing the most recent iteration of the design. This process is proposed to ultimately increase the quality and functionality of a design. The design iteration process is conducted for the in-house system and for the open source product to ensure the credibility in the design and that the layout looks well-structured. However, there is not much to be done on commercial VLE products as they are ready-made. The main CSF in this process is Stg-3.PR-D.4.CSF.1 Repeated iterative design process.

6.2.4 Stage-4 VLE Development and Deployment (DD)

After the design stage, the next stage is “developing and deploying the VLE system”. Stage-4 comprises four processes, as shown in Table 6-4. This stage comprises the core technical implementation of the VLE system depending on the system chosen in the decision making process AR.8. The main challenge faced in Stage-4 is dedicated infrastructure. A list of all challenges faced in this stage is presented in Appendix L.

Process	
In-house product	*Outsourced external vendor product*
Process DD.1 arrange development team for in-house product	Process DD.1 outsource external vendor product
Process DD.2 actual build of the software	Process DD.2 customisation and/or installation of the outsourced vendor product software
Process DD.3 iterative prototype and testing	
Process DD.4 VLE hosting	

Table 6-4 Processes and Sub-Process in Stage-4 of the Proposed Framework

Table 6-4 presents various processes and sub-process associated with Stage-4 of the proposed framework for VLE implementation, clearly showing that the initial two processes (DD.1 and DD.2) of this stage differ according to the type of the system whether in-house or outsourced from external vendor (which could be open source or commercial vendor product). There are several CSFs considered in Stage-4 of the proposed framework; a few of them are overarching factors that have an impact on the entire stage, while others are specific to a particular process or sub-process in that stage. These overarching CSFs are shown in Figure 6-5, where a key CSF is accessibility.

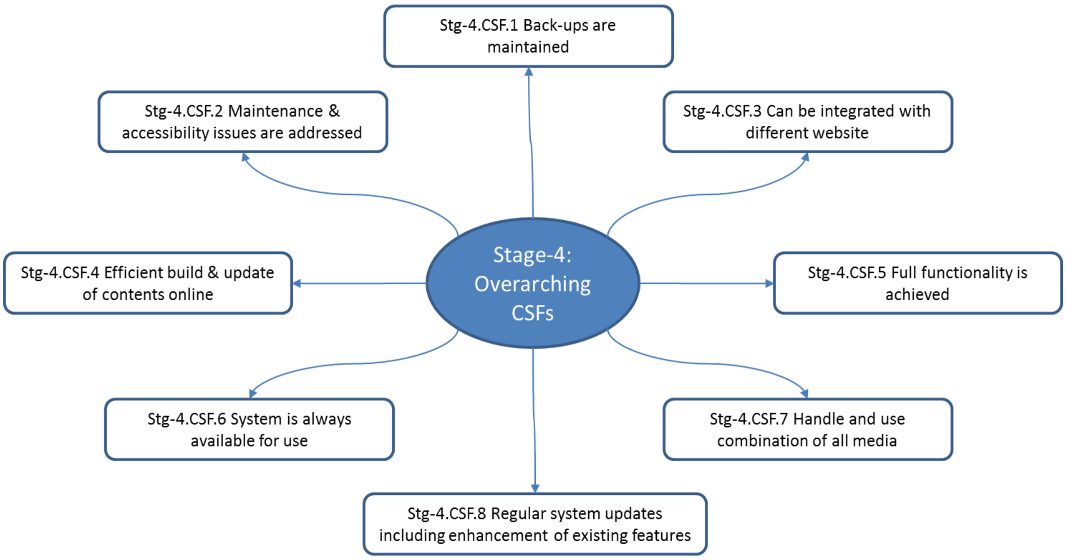

Figure 6-5 Stage-4 Overarching CSFs

Appendix K shows the list of various related stakeholders that need to be involved in Stage-4.The following sub-sections detail various processes and sub-processes of Stage-4 of the proposed framework for VLE system implementation. As mentioned earlier, the processes DD.1 and DD.2 are different according to the type of VLE system used (either in-house or outsourced from external vendor product). Therefore, DD.1 and DD.2 are separately mentioned for each type of VLE system.

Processes DD.1 and DD.2: For In-House Product

6.2.4.1 Process DD.1 Arrange Development Team for In-House Product

This is the first process of Stage-4 VLE development and deployment, where the system is built in-house. The HEI needs to consider a capable development team to build the software in the next process DD.4.2. As mentioned in Chapter 5, building the entire VLE system from scratch is very rare because it is time consuming and expensive (in terms of the resources). All CSFs related to this process are listed in Appendix J, where the main CSFs are having capable web developers and allocating sufficient resources.

6.2.4.2 Process DD.2 Actual Build of the Software

This is the second process of Stage-4 VLE development and deployment, where the system is built in-house. This process follows a specific software development cycle for the actual build of the VLE system. The entire development has to be iterative, using the classical software development model resulting in a prototype (Process DD.3), which needs to be evaluated (Stage-5) then fed-back into development (Stage-6) and design (Stage-3). Iteration facilitates enhancement in quality of the VLE system development; this includes also testing of the system in design stage (Process D.2). Moreover, it is important to be aware of and implement adequate legal procedures for the accessibility, plagiarism, copyright and other issues such as security and confidentiality. All related CSFs are listed in Appendix J.

Processes DD.1 and DD.2: For Outsourced External Vendor Product

6.2.4.3 Process DD.1 Outsource External Vendor Product

This is the first process of Stage-4 VLE development and deployment, where the VLE system is outsourced as external vendor product. This approach is different from actually developing something from scratch in that the HEI does not need a substantial in-house development team. In case of commercial vendor product, the HEI does not need to invest much in human resources as the system is ready-made and the provider will help and support the university in the technical part of the implementation process. However, when using an open source product, still some web developers and database administrators are needed for customisation of the VLE system if needed, developing various plug-ins, VLE system upgrades, or for maintaining the codebase and system administration. The main challenge faced by the commercial system is the lack of adaptability and customization in commercial systems. All CSFs related to this process are listed in Appendix J, where the main CSFs of this sub-process is Stg-4.PR-DD.1.CSF.1 Customised state-of-the-art installation considering standardization in quality and evaluation.

6.2.4.4 Process DD.2 Installation of the Outsource Vendor Product Software

This is the second process of Stage-4 VLE development and deployment, where the VLE system is outsourced as external vendor product. This process is about installation of the outsource vendor product software which is either open source or commercial. In case of the commercial vendor product, the installation and getting the application up and running is relatively smooth because of the support from the provider company where the HEI gets an installation package with instructions thus making it a lot more easier rather than spending long time in configuring everything which may cause additional problems, so from the ease of installation perspective it is a good choice for the HEIs. However, in terms of customisation to suit the HEI’s requirements, it does not have much flexibility as compared to the open source products. The key CSF in this process is Stg-4.PR-DD.2.CSF.1 Maintenance agreements are in place.

6.2.4.5 Process DD.3 Iterative Prototype and Testing

This is the third process of Stage-4 VLE development and deployment, where the design is refined through the multiple iterations of prototypes. The design is modified based on the analysis of the prototype using the Rapid Application Development (RAD) approach (Stansfield et al., 2009). In this process, testing is conducted to determine whether the VLE system is in-house or an outsource vendor product.

6.2.4.6 Process DD.4 VLE Hosting

This is the fourth process of Stage-4 VLE development and deployment, where the VLE system is locally managed by the HEI or hosted by a third party. The majority of HEIs continue to manage their VLE platform in-house. Also, the commercial product provider could host the VLE when there are limitations from the HEI, for example setting-up the hardware on time. In the case of open sources product that are community-supported large or experienced universities could host it for other universities. The main CSF in this process is Stg-4.PR-DD.4.CSF.1 VLE System is securely hosting, backed-up and maintaining.

6.2.5 Stage-5 Formative Evaluation (FE)

After conducting the development and deployment stage, the next stage is formative evaluation of the VLE system implementation. Stage-5 comprises two processes, as shown in Table 6-5. This stage is conducted after the VLE system hosting and applies to all types of VLE systems (in-house and external vendor product) to test run the system by conducting a pilot study and capture end-user feedback or evaluation information for improving the VLE system. This stage helps evaluating the VLE system before it is fully implemented and officially goes live for everyone to use. The main challenge faced in Stage-5 is Stg.5.CLG.1 Conducting formative evaluation. A list of all challenges faced in this stage is listed in Appendix L. A list of the main stakeholders involved in Stage-5 is listed in Appendix K.

Process
Process FE.1 Run pilot study
Process FE.2 Develop feedback mechanism

Table 6-5 Processes in Stage-5 of the Proposed Framework

Table 6-5 presents the main processes associated with Stage-5 of the proposed framework for VLE implementation, which are detailed as follows. A comprehensive list of all the CSFs related to this stage is listed in Appendix J.

6.2.5.1 Process FE.1 Run Pilot Study

This is the first process of Stage-5 Formative evaluation, where a pilot study is run to allow essential adjustments before the final release of the VLE system. It is essential to identify suitable pilot users to test the system and in the proposed framework for VLE system implementation it is recommended to include students in the pilot study, as the main user of the VLE system. The pilot study can also be conducted with early adopters that are part of the academic staff members or technologists who could participate in the pilot study to provide feedback. There are two modes of conducting the pilot study: first, through testing two or more VLE systems concurrently, conducting the pilot study, and then making the final decision for choosing an appropriate VLE system; second, making decision for the suitable VLE system, then pilot it in one or two schools/departments in the university, and then based on the results, improve the system and prepare to go live for the entire university. All CSFs related to this process are listed in Appendix J, where the main CSFs of this process is Stg-5.PR-FE.1.CSF.1 Involve students and academic staff members in the usability test of the VLE system.

6.2.5.2 Process FE.2 Develop Feedback Mechanism

This is the second process of Stage-5 Formative evaluation, where a feedback mechanism is developed, which can be periodic and continues evaluation of the VLE system before and after the final release. It includes feedback from the champions from different schools in the university who did not participate in the pilot study but it is useful to get their feedback before and after the final release. Chapter 5 reported different techniques to capture end-user feedback. This process is in line with the analysis and reviewing Stage-1 correspondingly. The feedback is gathered in Stage-1 to assess the status of end-user satisfaction of the current VLE and their expectations from the new system, which is crucial for the HE institution to make a decision accordingly. The importance of this process is to engage the end-user and maintain their buy-in, which will positively reflect on the end-user satisfaction and engagement with the VLE system, maintaining the change. The main CSF for this process is Stg-5.PR-FE.2.CSF.1 Rigorous internal assessment identifying weaknesses in provision (as mentioned in Appendix J).

6.2.6 Stage-6 Review and Bug Fixing (RBF)

After conducting formative evaluation, the next stage is Review and bug fixing of the VLE system implementation. Stage-6 comprises two processes, as shown in Table 6-6. In this stage, actions are conducted based on the review and feedback received in Stage-5 to solve any technical issues (e.g. hiccups in the hardware installation) or functionality issues that are discovered in the VLE system. The issues are reported and solved in-house or forwarded to the external vendor in order to fix all the bugs and ensure that all features are working properly. It is imperative to solve any problems before the final release of the VLE system in order to meet end-user needs. The main challenge is faced in Stage-6 is Stg.6.CLG.1 System incompatibility; a list of all the challenges faced in Stage-6 is listed in Appendix L. There are several CSFs considered in Stage-6 of the proposed framework, however, few of those are overarching factors that have impact on the entire stage, whereas others are specific to a process or sub-process in that stage. These overarching CSFs are shown in Figure 6-6, where the key CSF is Stg-6.RBF.CSF.1 Ability to tweak or improve the system continually. All CSFs related to this stage are listed in Appendix J.

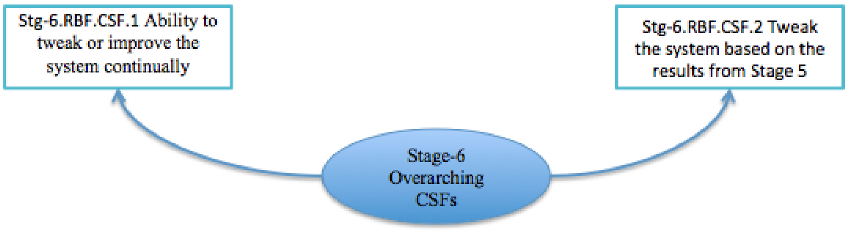

Figure 6-6 Stage 6 Overarching CSFs

Process
Process RBF.1 identify and prioritise issues from stage 5
Process RBF.2 resolve reported issues

Table 6-6 Processes in Stage-6 of the Proposed Framework

Table 6-6 presents the main processes associated with Stage-6 of the proposed framework for VLE implementation, which are detailed as follows.

6.2.6.1 Process RBF.1 Identify and Prioritise Issues from Stage-5

This is the first process of Stage-6 Review and bug fixing, where the issues are identified and prioritised in order to resolve them. The priority is for fixing the most important issue that affects the functionality of the VLE system. The key CSF in this process is Stg-6.PR-RBF.1.CSF.1 Serious issue first, as mentioned in Appendix J.

6.2.6.2 Process RBF.2 Resolve Reported Issues

This is the second process of Stage-6 Review and bug fixing, where after identifying and prioritising the reported issues, the HEI starts resolving them according to their importance including tweaks and modification of the VLE system according to the end-user feedback. This process considers regular reporting to improve the VLE system, which can feed into other stages of the proposed framework, such as request product enhancement if it is commercial vendor product and these requests can be brought into the new releases of the VLE system updates. The main CSF is Stg-6.PR-RBF.2.CSF.1 ensures that roll-out of the VLE system meets end-user needs. When the system is technically ready and is working well, then it is time to integrate it with other systems within the university.

6.2.7 Stage-7 Integration (I)

After conducting review and bug fixing, the next stage is integration of the VLE system implementation with other systems in the HEI. Stage-7 comprises two processes, as shown in Table 6-7. This stage is conducted after ensuring that the VLE system works well independently and then integration takes place. It is a very crucial stage in the lifecycle of the VLE system implementation because it is very difficult for the academic staff members to apply and use different technologies if each of these technologies needs different systems; therefore, it is important that the VLE system is allowing integration of the different systems, tools, and technologies to enable convenience of using them. In the proposed framework, there are two processes in the integration stage, as mentioned in Table 6-7.

Processes
Process I.1 integrate with other systems
Process I.2 integrate with tools and technologies

Table 6-7 Processes in Stage-7 of the Proposed Framework

There are several CSFs considered in Stage-7 of the proposed framework, however, few of those are overarching factors that have impact on the entire stage, whereas others are specific to a process or sub-process in that stage. These overarching CSFs are shown in Table 6-7, where the key CSF is information accessibility and sharing. A comprehensive list of all CSFs related to this stage is listed in Appendix J.

Figure 6-7 Stage-7 Overarching CSFs

The main challenge faced in Stage-7 is Stg.7.CLG.1 Complexity when integrated with other systems. A list of challenges faced in Stage-7 is listed in Appendix L, and Appendix K shows the list of various related stakeholders that need to be involved in Stage-7. The following sub-sections detail various processes and sub-processes of Stage-7 of the proposed framework for VLE system implementation.

6.2.7.1 Process I.1 Integrate with Other Systems

This is the first process of Stage-7 Integration, where the VLE system is integrated with mainstream programs and systems in the university. Although integration is planned in Stage-2 Planning and preparation, it is conducted after ensuring that the VLE system works well. The student information system is an example of other systems that are integrated with the VLE, since it is very important getting the systems automatically synchronized and getting the data between them consistent. The main CSF of this process is Stg-7.PR-I.1.CSF.1 Compatibility with other systems in the institution.

6.2.7.2 Process I.2 Integrate with Tools and Technologies

This is the second process of Stage-7 Integration, where the VLE system is integrated with other (complementary) technologies, such as university online library. In this way, the VLE system becomes an aggregation of various tools that users can use. The VLE system is a central media space with other tools, which are not part of the VLE but through integration become part of the entire VLE system; thus, making the VLE system as an aggregator of the technology rather than being an autonomous environment. The working group of e-learning facilitators (technical side) and the learning enhancement coordinators (education side) get on-board from the beginning, jointly working to ensure that the technology being developed is usable in the educational setting before it is integrated to the main VLE system. It is important that the students' learning experiences are enhanced through appropriate technologies for specific pedagogical purposes. Examples of various tools and technologies integrated with a VLE system are collaboration software (such as blogs, wikis and discussion boards), and mobile technology. A refined list of technologies and tools integrated with the VLE system is presented in Appendix N. This process is in line with process D.3 Interface Design in terms of designing how the VLE system is smoothly used, for example avoiding double syndication (i.e. no need to use the user IDs twice). The main CSF of this process is Stg-7.PR-I.2.CSF.1 Proper integration with easy steps and single login (as mentioned in Appendix J).

6.2.8 Stage-8 Migration (M)

After conducting integration, the next stage is migration of the VLE system. Stage-8 comprises two processes, as shown in Table 6-8. This stage is conducted when the university switches from an old VLE system to the new one. This stage should start after Stage-7 Integration and continues even after Stage-10 Final release and go live; therefore, the two systems should work in parallel for a year or so. This transition or migration stage is fundamental in saving time so there is no need to recreate all the material from scratch. The main challenge faced in this stage is getting information from different internal stakeholders regarding the migration of various course materials.

Processes
Process M.1 conduct migration from one system to another
Process M.2 migration of modules and course materials

Table 6-8 Processes in Stage-8 of the Proposed Framework

Table 6-8 presents the main processes associated with Stage-8 of the proposed framework for VLE implementation. The main challenge faced in stage-8 is Stg.8.CLG.1 Migrating the data. A list of various challenges faced in Stage-8 is listed in Appendix L, whereas a list of various related stakeholders that need to be involved in Stage-8 is presented in Appendix K.

6.2.8.1 Process M.1 Conduct Migration from One System to Another

This is the first process of Stage-8 Migration, where the plan for this stage is revised deciding the time required for migration and the time for the two VLE systems (old and new) to remain parallel. Even after integration of the new VLE with other systems, it is suggested to host both VLE systems onsite for a year until full migration of all data, student portfolios, and setting-up course modules in the new VLE system is gradually completed. This process is crucial in order to ensure easy migration for all the users and it needs to be conducted before the actual rolling-out of the old system to identify issues of migration by discussing and highlighting the areas, which might be of issue before the complete rollout. The main CSF for this process is Stg-8.PR-M.1.CSF.1 Steady and parallel migration.

6.2.8.2 Process M.2 Migration of Modules and Course Materials

This is the second process of Stage-8 Migration, where the course modules and materials are migrated; this can be conducted by the academic staff members, however training and support in migrating modules and course material should be provided. The main CSF is Stg-8.PR-M.2.CSF.1 Considering the timing before the start of academic year by when all the modules should be ready. All CSFs related to Stage-8 are listed in Appendix J.

6.2.9 Stage-9 Staff Training (T)

After conducting migration, the next stage is staff members training for the VLE system. Stage-9 comprises five processes, as shown in Table 6-9. It is about training the staff members in how to use the VLE system before its final release; it also includes training provided for the pilot users.

Process
Process T.1 organise staff members training
Process T.2 assign trainers
Process T.3 assign VLE administrator in each faculty
Process T.4 conduct training sessions
Process T.5 provide different supporting resources

Table 6-9 Processes in Stage-9 of the Proposed Framework

The proposed framework for VLE system implementation suggests that before final release the staff members should be trained to use the new VLE system and have access to the system at least three or four months before it goes live for everyone. The training stage is one of the most crucial stages in the lifecycle of the VLE system implementation, which is covered in detail Chapter 5, where the benefit of training is well-recognised in terms of increasing the confidence of using the new VLE system among staff members after training; it also helps to reduce resistance among users and increase acceptance and satisfaction of the new VLE system, thus fostering user engagement. Therefore, this stage acquires high importance and should be planned in advance. There are several CSFs considered in Stage-9 of the proposed framework. A few of those are overarching factors that have an impact on the entire stage, whereas others are specific to a process or sub-process in that stage. These overarching CSFs are shown in Figure 6-8, where it can be seen that the use of VLE for staff development by introducing them to the VLE system and training them to use the available functions to save their time and improve teaching quality is a major CSF.

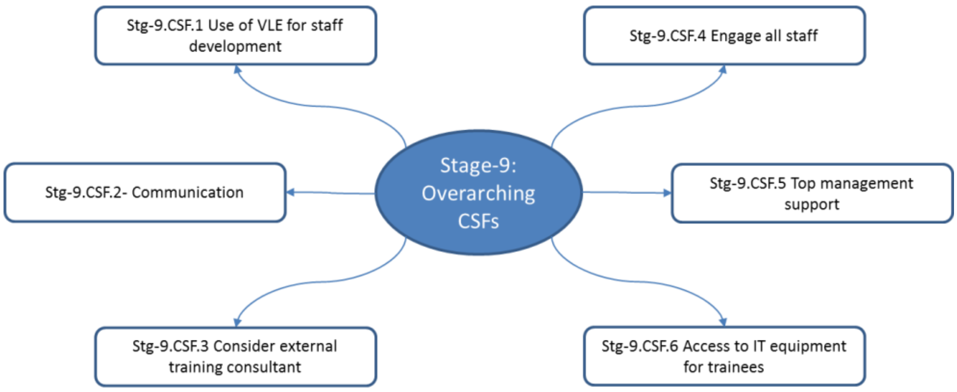

Figure 6-8 Stage-9 Overarching CSFs

The main challenge faced in Stage-9 is to foster staff members' awareness of the product and how to use it correctly, which can be addressed by developing digital literacy (TEL.4). A list of challenges faced in Stage-9 is presented in Appendix L. All CSFs related to this stage are listed in Appendix J. Appendix K shows the list of various related stakeholders that need to be involved in Stage-9. The following sub-sections detail various processes of Stage-9 of the proposed framework for VLE system implementation. The staff members training stage consists of five processes, as shown in Table 6-9, which are detailed as follows.

6.2.9.1 Process T.1 Organise Staff Training

This is the first process of Stage-9 Staff training, where well-designed training programmes are established. The training team (assigned in sub-process PP.3.1) needs to consider some tasks such as agreed times of training and the development of the training materials. It is a crucial process because the training programmes need to be prepared well in advance in order to provide training to the staff members some months prior to the full rollout of the VLE system; this is to enable them to start using the system effectively. The training programmes cover different training levels and types and are continued even after the VLE system rollout in Stage-11 of the proposed framework. All CSFs related to this process are listed in Appendix J, while the main CSF is Stg-9.PR-T.1.CSF.1 Consider special interest for each school or department. After organising the training programme, in the proposed framework it is recommended to assign qualified trainers in process T.2 in order to conduct the training sessions.

6.2.9.2 Process T.2 Assign Trainers

This is the second process of Stage-9 Staff training, where qualified, knowledgeable and experienced trainers are assigned; this is fundamental for an effective outcome of the training programmes. The training programmes are in-line with staff development unit and with different faculty teams; this is to acknowledge the academic staff members that the VLE system is capable of enabling the teaching they want to do using technology. It is suggested that the training teams work in association with the staff members development team (in line with Stage-11 Continual training and support). The staff members development team works alongside various academic departments to facilitate the development of plans for the wider adoption of the VLE system for teaching and learning activities, which needs to remain consistent with the HEI’s overall strategy for e-learning. The staff members’ development programmes need to provide further support for the development of innovative pedagogical practices including transformative changes in the course design and delivery. These activities are in line with TEL.4 Digital literacy, as mentioned in Chapter 5. The main CSF in this process is Stg-9.PR-T.2.CSF.1 Knowledgeable and experienced trainers. All CSFs related to this process are listed in Appendix J.

6.2.9.3 Process T.3 Assign VLE Administrator in Each Faculty

This is the third process of Stage-9 Staff training, where various VLE administrators are involved to work as e-learning advisors in each faculty or department to provide help and support to the academic staff members and to link them with the VLE team. Thus, the training sessions cannot cover every eventuality and therefore on-job training is more effective. This helps in getting accurate and quick answers and coping with different faculty needs, which consequently helps in reducing resistance and increasing staff members' engagement. These administrators could be assigned as representatives of their faculty in the e-learning champion network (Process CTS.4). The main CSF for this process is Stg-9.PR-T.3.CSF.1 Qualified VLE administrator.

6.2.9.4 Process T.4 Conduct Training Sessions

This is the fourth process of Stage-9 Staff training, where training sessions are conducted in different times according to user needs, for example providing training sessions for pilot users before the pilot study and for all staff members before the final release of the VLE system. The proposed framework includes conducting continuous training sessions at different levels of IT literacy of the trainees and according to the needs of each department such as bespoke training sessions. Also, appropriate training needs to be provided whenever a new tool or technology (e.g. online assessment) is integrated with the VLE system. Several training workshops could be organised as a good practice covering various aspects on the use of VLE system. The main challenge faced in this process is making staff members attend the training sessions; some of the institutions make it compulsory for all staff members to attend. It is also in line with TEL.4 and TEL.5 to demonstrate to the staff members what teaching activity they can perform with the VLE system. The main CSF for this process is Stg-9.PR-T.4.CSF.1 Adequate and effective training addressing a variety of needs using various technologies (as listed in Appendix J).

6.2.9.5 Process T.5 Provide Different Supporting Resources

This is the fifth process in Stage-9 Training, where supporting resources are provided for all users. This process is quite significant in terms of meeting needs of various users by offering additional support such as online downloadable guides and videos about the VLE system. The main challenge is addressing different user needs. The main CSF for this process is Stg-9.PR-T.5.CSF.1 provision of resources such as guidelines, user manual, induction advice, and other documentation. All CSFs related to this process are listed in Appendix J.

6.2.10 Stage-10 Final Release and Go Live (GL)

After the staff members training stage, the next stage is the final release and go live of the VLE system. Stage-10 comprises three processes, as shown in Table 6-10. During this stage, the VLE system goes live for everyone, which is normally at the beginning of an academic year. In case of migration from the old VLE system to the new one, the two systems should overlap for approximately one year, as mentioned in Stage-8, until full migration is achieved. Table 6-10 presents the main processes associated with this stage.

Processes
Process GL.1 preparation for go live
Process GL.2 communicate and inform all the stakeholders in the university
Process GL.3 launch the VLE

Table 6-10 Processes in Stage-10 of the Proposed Framework

The main CSF of this stage is implementation of an integrated learning environment. A list of challenges faced in Stage-10 is mentioned in Appendix L, where the main challenge is Stage-10 is Stg.10.CLG.1 Managing the overlap between the two systems. Appendix K shows a list of various related stakeholders that need to be involved in Stage-10. The following sub-sections detail various processes of Stage-10 of the proposed framework for VLE system implementation.

6.2.10.1 Process GL.1 Preparation for Go Live

This is the first process in Stage-10 Final Release and Go Live, where the proposed framework suggests conducting an intensive preparation for going live. It is imperative to make everything ready for the academic staff members and students before it goes live, and all the course modules should be transferred to the new VLE system before the beginning of the academic year; this allows the academic staff members to prepare various course materials in advance and download them. Hence, the readiness of VLE system before the start of the academic year helps the academic staff members to do their work more efficiently, since they have time to learn the system and prepare lesson plans before they start teaching, which positively reflects on the teaching practices. Also, it is important to involve the VLE administrators before the VLE goes live to ensure they are ready to help and support the academic staff members. Moreover, during the preparation for go live, the VLE team considers around two or three weeks mitigation time if something goes wrong with the VLE system then the team has time to fix it and be ready at the beginning of the academic year. The risk mitigation planning is conducted in process PP.3 Prepare schedule and project initiation documents. This is also important in the action of upgrading the VLE software. The main CSF of this process is Stg-10.PR-GL.1.CSF.1 Availability of the VLE system to the staff members before the start of the academic year. A list of all CSFs related to this process listed in Appendix J.

6.2.10.2 Process GL.2 Communicate and Inform all the Stakeholders in the University

This is the second process in Stage-10 Final release and go live, where the proposed frameworks suggests communicating and informing all related stakeholders and keeping them updated and aware with the latest news about the VLE system implementation, which includes the time of final release and how this will unfold. The main CSF of this process is Stg-10.PR-GL.3.CSF.1 Involve all the stakeholders, which are listed in Appendix J.

6.2.10.3 Process GL.3 Launch the VLE

This is the third process of Stage-10 Final Release and go live, where the new VLE system is launched in the entire HEI. By conducting this process the technical part of the VLE system implementation is almost finished and it is not allowed to do major change after the launch of the VLE system, as the staff members and students start using it; however, it continues to be upgraded, maintained and supported. Furthermore, the importance of this stage is due to the impact of the first impression on the user acceptance; therefore it is important to be successful and smooth. The main challenge faced in this process is time keeping, as the VLE implementation team is quite restricted with timeline because the VLE system needs to be launched at the beginning of the academic year; therefore, it is important to consider the allocation of the risk period. The main CSF of this process is Stg-10.PR-GL.4.CSF.1 Everything ready to use in time for the launch.

6.2.11 Stage-11 Continual Training and Support (CTS)

After the final release and go live stage, the next stage is continual training and support (CTS) for the VLE system. Stage-11 comprises four processes, as shown in Table 6-11. It is a very important stage in the VLE system implementation because of the need to have in place a mechanism for the sustainable use of the VLE system. It is imperative to have clear and effective communication schemes for interacting with students and staff members at different levels, using formal (e.g. email) or informal (e.g. social network) tools, as well as ensuring that clear guidelines and feedback tools are provided.

Processes
Process CTS.1 organise continuous training programmes and support
Process CTS.2 evaluate the effectiveness of the training provided
Process CTS.3 promote applying technology in pedagogical practices
Process CTS.4 establish champion network

Table 6-11 Processes in Stage-11 of the Proposed Framework

The processes shown in Table 6-11 provide constant opportunities for the staff members and students to learn the effective use of the VLE system. Once the VLE system is live, continuous training sessions should be organised for the staff members and the students to familiarise them with the new VLE system encompassing the basic functions and features which is a technical training for the first semester after the VLE system goes live, then by the beginning of the second semester the university should consider more practical courses for the staff members and students, such as technology-enhanced learning support courses. There are several CSFs considered in Stage-11 of the proposed framework; a few of them are overarching factors that have an impact on the entire stage, while others are specific to a particular process or sub-process in that stage. These overarching CSFs are shown in Figure 6-9 where the key CSF is induction for the new staff members and students. All CSFs related to this stage are listed in Appendix J.

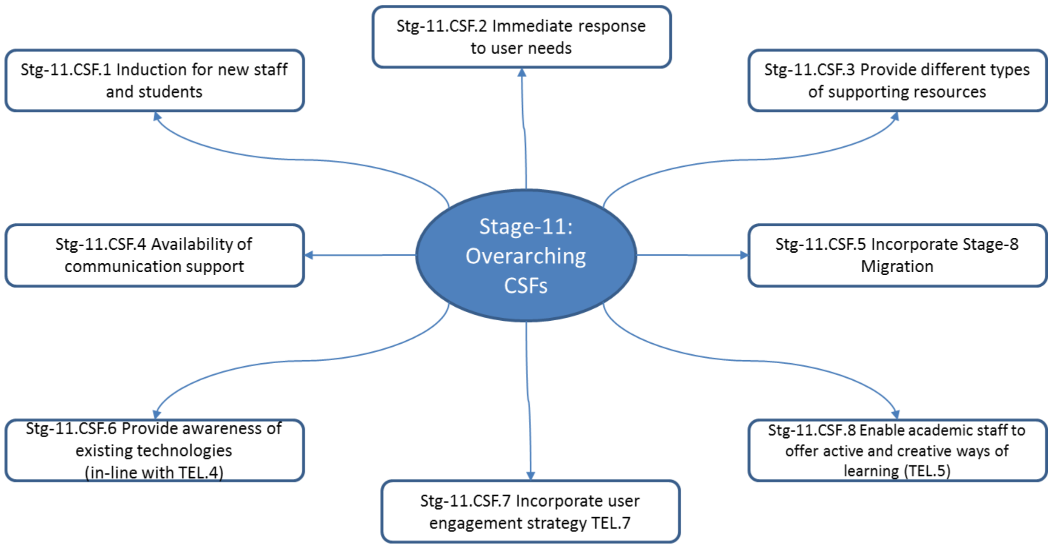

Figure 6-9 Stage-11 Overarching CSFs

The main and usual challenge faced in this stage is Stg.11.CLG.1 Addressing major technical issues occurring during the first year of rolling out the new VLE system; however, with adequate support this challenge can be overcome. Other challenges faced in Stage-11 are listed in Appendix L. Appendix K shows the list of various related stakeholders that need to be involved in Stage-11.The following sub-sections detail various processes of Stage-11 of the proposed framework for VLE system implementation.

6.2.11.1 Process CTS.1 Organise Continuous Training Programme and Support

This is the first process of Stage-11, where constant support is provided with different resources, as indicated in Chapter 5. Regular training is imperative, which requires sustainable training programmes that allow provision of continual training and support for staff members and student. Therefore, the proposed framework includes organising sustainable training programmes that are continuous. Moreover, it is suggested to adopt a training model to encourage staff members to attend the training with rewards or incentives such as offering bronze, silver, or golden stages model (as mentioned in Chapter 5) to motivate them to be engaged also to attend a continuing professional development (CPD) course with different training levels, allowing the trainees to be awarded a certificate when they finish all the levels. The main CSF for this process is Stg-11.PR-CTS.1.CSF.1 Provide continual training and support for staff members and student.

6.2.11.2 Process CTS.2 Evaluate the Effectiveness of the Training Provided

This is the second process of Stage-11, where the effectiveness of the training is evaluated. This process is important in order to improve the training programmes and meet end-user needs. Such evaluations should be conducted on a regular basis. The proposed framework recommends getting user feedback on the training provided even when the pilot users are trained for the pilot study; this is to improve the follow-on training sessions. The main CSF for this process is Stg-11.PR-CTS.2.CSF.1 Get user feedback on the training provided.

6.2.11.3 Process CTS.3 Promote Applying Technology in Pedagogical Practices

This is the third process of Stage-11, where staff members training is envisioned from a pedagogical point of view to assess the possibilities of using a VLE system in various pedagogical practices, such as using VLE system to promote motivational online material for the students. This process is in line with TEL.5, which is covered in Chapter 5. The main CSF for this process is Stg-11.PR-CS.3.CSF.1 Acknowledge staff members online working hours. All CSFs related to this process are listed in Appendix J.

6.2.11.4 Process CTS.4 Establish Champion Network

This is the fourth process of Stage-11, where a network of e-learning champions from each department is established to improve the quality of the institutional VLE system provision. This process is in-line with TEL.10, where ICT is used to build supportive, professional networks and communities of practice; it supports staff members' development and enables forming a common vision. In this process, communication channels between champions are established whereby various e-learning enthusiasts have the opportunity to demonstrate the way they are using the VLE system.

6.2.12 Stage-12 Continual Evaluation (E)

After the continual training and support stage, the next stage is continual evaluation of the VLE system. Stage-12 comprises four processes, as shown in Table 6-12. This is the final stage in the proposed framework for VLE system implementation, which is making judgment and assessment to determine whether things are proceeding well and if the VLE system is being used by the staff members and students. This stage requires an external examiner to evaluate the VLE system and includes assessing sustainability of the VLE system implementation. Moreover, this stage ensures continuous improvement in the VLE system and that the VLE system is implemented successfully; it is in-line with TEL.3 and consists of a technology enhanced learning forum, which is a team of e-learning experts. This evaluation is a yearly cycle encompassing the collection, reporting, and analysis of data about learners in order to enhance learning through the use of VLE system.

Processes
Process E.1 design and apply VLE quality assurance procedures
Process E.2 conduct evaluation studies to measure the quality and effectiveness
Process E.3 make recommendations for improvement
Process E.4 develop centre of excellence

Table 6-12 Processes in Stage-12 of the Proposed Framework

There are several CSFs considered in Stage-12 of the proposed framework; a few of them are overarching factors that have an impact on the entire stage, while others are specific to a particular process or sub-process in that stage. These overarching CSFs are shown in Figure 6-9 where a key CSF is ensuring efficiency and sustainability. Other CSFs related to this stage are listed in Appendix J.

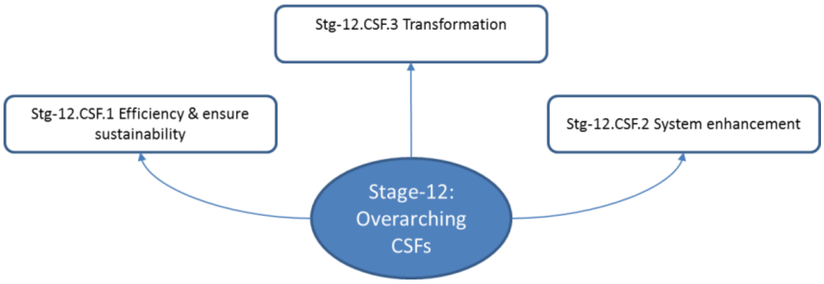

Figure 6-10 Stage-12 Overarching CSFs

The main challenge faced in stage-12 is Stg.12.CLG.1 Sustainability. All challenges faced in Stage-12 are listed in Appendix L. Appendix K shows the list of various related stakeholders that need to be involved in Stage-12. The following sub-sections detail the various processes of Stage-12 of the proposed framework for the VLE system implementation.

6.2.12.1 Process E.1 Design and Apply VLE Quality Assurance Procedures

This is the first process in Stage-12 Continual evaluation, where the proposed framework includes Designing and applying VLE quality assurance procedures for the VLE system. It is quite important to measure the performance of the VLE system in order to provide evidence to the stakeholders about the quality maintained and the standards attained. The main CSF for this process is Stg-12.PR-E.1.CSF.1 Clear quality standards.

6.2.12.2 Process E.2 Conduct Evaluation Studies to Measure the Quality and Effectiveness

This is the second process in Stage-12 Continual evaluation, where the evaluating criteria are derived from the end-users' requirements. The proposed framework suggests employing learning analytics as evaluation studies to get an idea about how the VLE system is being used across the HEI and check if there are any pertaining issues that need to be resolved. Eventually, the evaluation results should be positive if the institution constantly considers the formative evaluation (Stage-5) and addresses the issue raised by the end-user. Moreover, it is imperative to improve the effectiveness of VLE system by enhancing user experience as required by TEL.6, and as presented in Chapter 5. The main CSF in this process is Stg-12.PR-E.2.CSF.1 Conducting regular evaluation.

6.2.12.3 Process E.3 Make Recommendations for Improvement

This is the third process in Stage-12 Continual evaluation, where based on the evaluation conducted in Process E.3 recommendations for improvement in the VLE system are considered in terms of adding extra functionality or improving on existing features. The main CSF in this process is Stg-12.PR-E.3.CSF.1 Consider enhancements in terms of student learning and improved academic performance.

6.2.12.4 Process E.4 Develop Centre of Excellence

This is the fourth process in Stage-12, where the proposed framework suggests developing the centre of excellence to work in line with the TEL strategy, as it is one of the requirements in TEL.3 presented in Chapter 5. The main CSF in this process is Stg-12.PR-E.4.CSF.1 Accreditation and recognition for courses is obtained through partnerships with respected professional, academic organisations, and societies.

The proposed framework for VLE system implementation comprises twelve stages and forty-five processes, with each stage being associated with specific processes, related stakeholders, CSFs, and CLGs. The proposed framework for VLE system implementation is presented in Figure 6-2 in Section 6.2, while the next section presents an alignment between the proposed framework and the TEL strategy presented in Chapter 5.

6.3 In-line with TEL Strategy

Alignment of VLE system with the TEL strategy is presented in Chapter 5. The proposed framework (Figure 6-2) illustrates a coherent interaction between TEL strategy and the VLE system implementation and is demonstrated in Table 6-13. For example, a requirement of TEL.3 is to establish an e-learning centre (TEL centre); the proposed framework for VLE system implementation suggests developing such centre of excellence in Process E.4 of Stage-12. This centre obtains accreditation, and identifies and disseminates best practices. Moreover, it highlights good practices and teaching achievements, as well as creates awareness around various teaching and learning tools and resources adopted across the HEI.

Tel strategy	*Alignment with the proposed framework*	*Description*
TEL.1- Review and analysis	Stage-1 Analysis and Review Process AR.8.3 Make choices based on the results in ar.7 in stage-1	TEL.1 requires conducting review and analysis which helps the HEI by leading to narrative and discourse about what the TEL looks like and decisions should be in-line with the TEL strategy, conducted in process AR.8.3 in stage-1 of the proposed framework
TEL.2- Implementation of e-learning tools and technologies	Process AR.5 Define and prioritise the requirements in stage-1 Sub-process AR.8.2 Consider the overall model of learning	TEL.2 requires that e-learning tools and technologies are implemented considering the learning overall model (blended or pure online learning); this is conducted in sub-process AR.8.2 moreover, the HEI makes their choices according to the end-user needs generated in AR.5
TEL.3- Tel centre	Process E.4 Develop centre of excellence in stage-12	A requirement of TEL.3 is establishment of an e-learning centre and development of the education workforce with coordinated responsibilities; this is conducted in process E.4 of the proposed framework
TEL.4- Digital literacy	Process T.2 Assign trainers in stage-9 Process T.5 Provide different supporting resources in stage-9 Stage-11 Continual training and support	TEL.4 requires increasing awareness among staff members with various teaching and learning tools and resources adopted across the university. Digital literacy is an important theme that needs to be considered for staff members and students in terms of training and it literacy or awareness that is conducted process T.2 and T.5 in stage-9, and stage-11 of the proposed framework
TEL.5- Apply technology in pedagogical practices	Process T.3 Assign VLE administrator in each faculty in stage-9 Process T.4 Conduct training sessions in stage-9 Process T.5 Provide different supporting resources in stage-9 Process CTS.3 Promote applying technology in pedagogical practices in stage-11	TEL.5 requires promoting technology in pedagogical practices, which is conducted in process T.3, T.4, T.5 through adequate training, and process CTS.3 of the proposed framework
TEL.6- Enhance user experience	Sub-process AR.4.2 Analyse staff members' needs and their technology awareness in stage-1 Stage-9 Staff members training	TEL.6 requires enhancing learning experience that demands delivery of effective, relevant, and pedagogically rich training to all staff members and students; this is conducted in sub-process AR.4.2 where pedagogy supports

Tel strategy	*Alignment with the proposed framework*	*Description*
	Stage-11 Continual training and support	and enhances students' learning experiences and stage-9 and stage-11 in terms of the training provided
TEL.7- User engagement strategy	Sub-process AR.4.1 Analyse students' needs in stage-1 Process AR.5 define and prioritise the requirements in stage-1 Process PP.5 Arrangement and announcement in stage-2 Stage-9 Staff members' training Process CTS.3 Promote applying technology in pedagogical practices in stage-11	It is an important element of TEL strategy to foster students' and staff members' engagement; this is conducted by analysing their needs in AR.4.1, involving them in gathering requirements in process AR.5, and acknowledging the staff members who exploit the potential of e-learning where departments prepare plans for wider adoption of VLE system in process PP.5 of the proposed framework
TEL.8- Cultural change	Sub-process AR.2.2 Assess change implication in stage-1	TEL.8 requires assessment of the change implications which is conducted in sub-process AR.2.2 of the proposed framework
TEL.9- Innovation	Sub-process D.1.1 Establish learning and teaching unit	TEL.9 requires considering technical and pedagogical innovation to support innovation in teaching and learning where the academic staff members are able to innovate and lead in various pedagogical developments; this is conducted in sub-process D.1.1 of the proposed framework which considers new forms of teaching and learning
TEL.10- E-learning champion network	Process CTS.4 Establish e-learning champion network in stage-11	TEL.10 requires establishing an e-learning champion network, which is conducted in process CTS.4 of the proposed framework
TEL.11- Institutional partner	Process AR.2 Institutional analysis in stage-1 Process PP.4 Consult with external supporting body in stage-2	TEL.11 requires establishing effective partnerships with all stakeholders and share with wider he community, which is conducted in process AR.2 and process PP.4 of the proposed framework

Table 6-13 Alignment of TEL Strategy with Proposed Framework for VLE System Implementation

Another example of alignment of the proposed framework is with TEL.7 (as shown in Table 6-13), which is an important element of the TEL strategy and considers fostering learners' engagement which could be through involving students in gathering the requirements as in Process AR.5 Define and prioritise the requirements as well as Sub-process AR.4.1 Analyse student's needs. Also, it is in line with Stage-9 Staff training and Stage-11 Continual training and support, which is to do with providing motivation scheme, performance indicators, and institutional recognition for career development path.

6.4 Discussion

The validation process (Wang et al., 2007) is intended to check or prove the validity or accuracy of something. In this research, the conceptual framework (built out of the literature review analysis considering good practices in Chapter 3) is validated against the analysis of findings from the case studies (which is presented in Chapter 5) to propose a good practice framework for the VLE system implementation, as shown in Figure 6-2Figure 6-2. The validation strategy adopted (Kvale, 1994) is mentioned in detail in Chapter 4. The proposed framework is a synthesis of findings from the literature review (secondary data) and from the empirical study (primary data). Findings from the literature review analysis identify various key elements of VLE system implementation which are stages, processes, CSFs, stakeholders involved, CLGs faced, risks associated, tools, technologies and methods integrated with the VLE system. These elements are validated against the findings from the case studies where the stages and processes are presented in Appendix E. The results of synthesis of the findings from both resources are presented and articulated in the proposed validated framework presented in Section 6.2.

The proposed good-practice framework endorses findings from the literature, for example the Review and analysis stage is reported as the first phase in the framework by Wild et al. (2002), and also referred to as 'diagnoses stage' by Saeedikiya et al. (2010). The Review and analysis stage includes organisational setting and technical infrastructure referred to in the McPherson and Nunes (2008) framework for the VLE system implementation. The proposed framework suggests conducting review and analysis of the current situation of e-learning system as highlighted in the literature by several studies (Aimard, 2007; Engelbrecht, 2003; MacLean and Scott, 2011; Quinsee and Bullimore, 2011). However, some of the stages of the proposed framework are not explicitly reported as separate stages in the existing frameworks - for example Stage-8 Integration and Stage-9 Staff training.

The proposed framework is quite comprehensive, covering the key technical and pedagogical parts of the VLE system implementation comprising of twelve fundamental stages and forty-five processes that any HEI could apply in order to successfully implement a VLE system. Thus, addressing the limitations of existing frameworks that have a limited number of stages (e.g. Collis and Moonen, 2001; MacDonald et al., 2001). One of the research contributions is presenting these stages in order and highlighting the interrelationship among each of them, as explained in Section 6.2. In doing so, the proposed framework addresses the limitations of some of the existing frameworks like Wild et al. (2002), Alhogail and Mirza (2011). As shown in Figure 6-2, the order of stages in the proposed framework is mostly sequential and mainly executed in parallel - for example, Stage-9 (Staff training) and Stage-10 (Final release and go live) are in parallel, because training could be provided alongside of the final release. Moreover, Stage-9 is parallel to Stage-5 (Formative Evaluation) as training is provided to staff members also before the pilot study; Stage-8 (Migration) and Stage-10 (Final release and go live) are also in parallel as migration of data takes place before go live and the migration of course modules is taking place during and after the go live.

Each stage is associated with specific processes and related SHs, CSFs, and CLGs that are identified from the good practices. The proposed framework offers comprehensive details, thus addressing the limitations in some existing frameworks where no such details are provided (e.g. Alhogail and Mirza, 2011; Collis and Moonen, 2001; MacDonald et al., 2001; MacLean and Scott, 2011; Mishra, 2002; Singh, 2003; Wild et al., 2002).

Moreover, some of the key processes are not explicitly identified in the literature; therefore, these are elicited as a unique and novel contribution of this research. A refined and validated list of all stages and processes of the proposed framework are presented in Section 6.2. The validation is also demonstrated by cross-checking the occurrence of elements in the literature and the empirical data (from case studies or good practices) - for example the process PP.2 Identify and involve related stakeholders (Aimard, 2007; DFE, 2004) is frequently reported as a good practice in case studies and takes place in different stages of the proposed good-practice framework, thus demonstrating the importance of this process. The proposed framework also includes certain processes that are highly recognised as good practice by most HEIs but rarely conducted - for example, Sub-Process AR.2.1 Assessing the benefit and change implication, with its two sub-processes (Sub-Process AR.2.2 Assess change implications, and Sub-Process AR.2.1 Assess benefits) in Stage-1 of the proposed VLE system implementation framework. Furthermore, the proposed framework recognises the attitudinal and cultural problems associated with technology that have been quite well-recognised and highlighted in several places in the literature (Doherty, 2010; Wild et al., 2002). These problems are often with staff members that are facing challenges in using new technologies, thus resulting in negative attitudes towards the adoption of VLE systems due to the problem/difficulty of having to learn new skills and master new technologies. Therefore, the proposed good-practice framework focuses on important or critical success factors that make the VLE system transition acceptable and manageable, such as to involve staff members in early stages of VLE system implementation, foster their digital literacy and acknowledging their engagement and commitment. The proposed framework implies that many academic staff members need better ICT training, which also illustrates that fostering staff members' knowledge with digital literacy in TEL strategy is one of the good practices in VLE system implementation. This has also been endorsed by the reports of a survey by Gramp (2013), where it was found that a significant proportion (45%) of students use e-learning in an enhanced or fully integrated way due to significant improvements in the use of VLE systems by the majority of academic staff members. This is an endorsement to the role of staff members in enhancing students' use of a VLE system. It also supports the TEL strategy highlighted in the proposed framework as the good practice of VLE system implementation in HEIs. The proposed framework entails implementation of the TEL strategy through embedding e-learning (Aimard, 2007) into daily teaching and learning practices, such as integration in the university's vision and general objectives; establishment of an e-learning centre with coordination responsibilities; development of a pedagogical framework and guidance pack; and implementation of an integrated learning environment. All of these, as processes or sub-processes, are part of the proposed framework.

The proposed good-practice framework highlights several critical success factors (CSFs) that are important to consider for a successful VLE system implementation in HEIs. Comprehensive lists of CSFs identified from the literature and the case study findings are presented in Appendix B and Appendix G respectively, where these CSFs are identified from the literature and endorsed via the empirical findings from the case studies - for example, including key external decision makers (Aimard, 2007; Bruck, 2010; DFES, 2003; MacDonald et al., 2001; MacLean and Scott, 2011; Quinsee and Bullimore, 2011; Sharma et al., 2010; Stansfield et al., 2009) and forming partnerships (DFE, 2004; Sarker et al., 2013) have been identified from the literature and also highlighted as good practices from the empirical data. However, a limitation of existing frameworks is that the CSFs are not mapped to specific stages or processes of VLE system implementation. The proposed framework contributes to the body of knowledge by mapping these CSFs to the relevant stage and process (or sub-process) where these are critical to be considered, for example as mentioned in Appendix J Stg-1.Sub-PR-AR.5.1 CSF.4 Involve representatives from each faculty in a CSF that should to be considered in Stage 4 (Analysis and review) and sub-process AR5.1 (Define specifications and requirements), thus making it easy for the HEIs to apply the proposed framework with such specific details.

Furthermore, the proposed framework identifies related stakeholders that need to be involved in each specific stage of the VLE system implementation; this is missing in some of the existing frameworks, such as by MacLean and Scott

(2011) and Wild et al. (2002). The proposed good-practice framework identifies academic staff members and students as the most important stakeholders; this is also evident from the literature. The refined list of the stakeholders involved in each specific stage of the proposed framework can be found in Appendix K; which adds value to the proposed framework.

The challenges faced (CLGs) in each stage of the proposed good-practice framework are listed in Appendix L, where some of the general challenges for the VLE system implementation in HEIs include staff members' resistance to change, poor user experience, lack of engagement, lack of awareness, and lack of funding body; these are also highlighted in the literature (Doherty, 2010; MacDonald et al., 2001; Stansfield et al., 2009). However, the existing frameworks, such as (Mishra, 2002), do not map these challenges to specific stages of VLE system implementation, which is another novel aspect of the proposed good-practice framework. It is believed that the proposed framework holds the potential in aiding different departments within an HEI that are at different paces for developing various VLE activities within any of the three categories of the implementation cycle (Beastall and Walker, 2007), which are: mature (extensive VLE activity and adoption of delegated training and support activities); developing (where there is a commitment to broaden and depend departmental activity); or pilot (where there has been no previous VLE activity, and departments are embarking on first developments).

The risks associated with VLE system implementation are permeating the entire VLE system framework. Risk assessment is a crucial factor to the success of VLE implementation (Beastall and Walker, 2007) and has been considered in e-learning development processes in HEIs by several studies (Arami et al., 2006; Chiazzese and Seta, 2006; Doherty, 2010; Ward et al., 2010). The proposed framework highlights several risks associated with VLE system implementation, thus endorsing findings from the literature - for example copyright issues concerning resources such as images, sound files, video clips, and animations and poor infrastructure (Doherty, 2010); finance (need to have enough money) (Arami et al., 2006; Pasian and Woodill, 2006; Wallace, 2006); and system-related and technical risk (Chiazzese and Seta, 2006; IEEE, 2001). Furthermore, the proposed framework identifies some of the risks (presented in Appendix M) that are missing in the literature and are only highlighted through the case studies - for example, RISK-14 Failure to gather accurate requirements for the VLE system and Lack of timely support. This demonstrates the added value of the proposed framework in terms of identifying risks through real-life experiences or good practices of implementing VLE system in HEIs.

The tools and technologies integrated with the VLE system are mentioned generally in the literature with an overall description of the learning and teaching methods that merge to make the learning process more effective, and these are not tied to a specific VLE implementation stage or process as to where these should be considered (Collis and Moonen, 2001). For example, Gramp (2013) mentions that interactive tools are most commonly used for e-learning systems, social networking platforms and lecture capture, and use of electronic assignment submissions; however, there is no mapping conducted on the stages where these should be integrated. The proposed good-practice framework explicitly mentions that the tools and technologies (presented in Appendix N) are integrated in Stage-7 whereas the learning and teaching methods (presented in Appendix O) are associated with Stage-3 of the proposed framework.

Validating the theoretical part from the literature with real good practices gives the proposed framework a unique advantage. Doherty (2010) highlights an established fact that mere technologies do not improve student learning; in fact, this is achieved by the good learning design where technologies are employed meaningfully and purposefully to facilitate and enhance student learning (Jones, 2007). Since enhancement of the quality of teaching and learning is the primary driver for implementing a VLE system in an HEI, the proposed framework highlights such elements that are not specifically mentioned in the literature and are strongly recommended as a good practice in the case studies; hence it becomes a unique contribution of the proposed framework to add to the overall body of knowledge from good practice in the real world that is missing in the literature. For example, the proposed framework highlights the importance of demonstrating external vendor products that are shortlisted in order to make the right choice – something not covered by the existing frameworks and not specifically highlighted in the literature. Moreover, the proposed framework entails assigning multiple teams for VLE system implementation project including technical, pedagogical and training teams; these different types of teams are not specifically mentioned in the literature. Moreover, the proposed framework focuses on considering the student's and the staff members' perspective together, which is not specifically highlighted in the literature. These include setting up various channels through which students can contribute and feedback, and arrange meetings with students by organising student forums with student representatives. In this respect, the proposed framework highlights the good practices of requirements gathering techniques, such as conducting focus groups with e-learning experts from students and academic staff members. In this way, students and staff members are involved in the VLE system implementation in terms of gathering the requirements, participating in pilot studies, usability testing, training, and continuous evaluation; thus encapsulating perspectives of the most important stakeholders. Moreover, the proposed framework illustrates students' preference to flexibility in learning; VLE systems are often run poorly where the students are not generally provided with adequate training in order to understand how to use them. This is not an easy process; however, it is a good practice from the real experiences of VLE implementation that enables meeting end-user needs, decreasing resistance, and increasing satisfaction among end-users and most importantly, enhancing student's learning experiences.

Several existing frameworks such as those of MacDonald et al. (2001), the IEEE (2001), and Mishra (2002) have the limitation of single-sided focus; i.e. considering the technological, pedagogical or organisational sides of VLE system implementation individually, whereas the proposed framework covers all of these dimensions. Therefore, it provides recommendations on how HEIs can successfully implement a VLE system. Moreover, the conceptual framework is generic, covering different e-learning technologies and systems; and although the proposed framework is validated specifically for VLE systems, it could be customised for other types of e-learning systems as well.

6.5 Conclusion

This chapter presents a good-practice-in-context framework for the implementation and use of VLE systems in HEIs, as shown in Figure 6-2 which is the contribution of this research. Another main contribution of the proposed framework is that it covers different perspectives through the involvement of multiple stakeholders including decision makers, e-learning experts, VLE system implementation team, academic staff members, and students. The conceptual framework presented in Chapter 3 is interpreted from the good practices in secondary data collection and then it is validated from the good practices in primary data collection; this approach derived and enhanced the proposed framework for VLE system implementation. Moreover, the proposed framework aims to address concerns of the learners, academic staff members, and the challenges presented by the technology, so that online learning can take place effectively. The research data and findings from the survey, interviews and observation from both case studies were analysed in Chapter 5 and used to enhance the conceptual framework, which was built from the analysis of secondary data (Chapter 3).

This research concludes that a successful VLE system implementation relies on clear institutional TEL strategy accompanied with active involvement of the end-users in order to fully implement sustainable adoption of the VLE system, which in return enhances student learning experience and focuses on end-user needs (mainly students and academic staff members as the main stakeholders). Moreover, the institutional requirements put together need to be in-line with the academic staff members because if they are not satisfied with using the VLE system then the VLE system evaluation may not render good results. Hence, the institutional analysis and end-user analysis are very closely interlinked. Also, the findings reported in Chapter 5 indicate that end-user analysis should be considered in the VLE implementation mainly for the academic staff members and the students; this is because they are considered as the main users of the VLE system. The proposed framework considers the factors for raising the standards of the VLE system - for example consider quality assurance, share good practices and meet the learner needs. Hence, the proposed framework offers a set of guidelines to HEIs for a successful implementation of a VLE system. The next chapter presents conclusions of this research.

Chapter 7: Conclusion

7.1 Introduction

To conclude this study, this chapter provides a summary of the thesis and derived conclusions from the literature and empirical findings; also limitations of this research are discussed. Moreover, the original contributions of the work are summarized. Finally, recommendations for future research in the area of VLE system implementation in HEIs are provided.

7.2 Research Summary

Nowadays, a major concern for many HEIs is to make the most out of VLE system implementation, which constitutes a big investment. HEIs aim to establish a centrally supported VLE system providing a unified platform for communications, content delivery, course management and assessment, with managed interfaces linked to university IS and resources. The implementation of an integrated learning environment such as a VLE system is enhanced by integrating additional tools, and new technologies are fundamental to cope with 21st century developments and increased teaching and learning demands.

The implementation of a VLE system requires a framework that covers different aspects including institutional, technical and pedagogical considerations. Therefore, a good-practice-in-context framework is expected to address all these aspects of the VLE system implementation to help the HEIs successfully implement a VLE system. In order to build a good-practice-in-context framework for the implementation and use of VLE systems in HEIs, it is important to look into the good practices that have already been in place, and identify not only the key issues, but also the key elements relating to these good practices. Therefore, this research addresses the research question: *'how to build a good-practice-in-context framework for the implementation and use of VLE systems in Higher*

Education Institutions (HEIs)?' Other follow-up questions are *what are the most important CSFs of the VLE system implementation?*; *what challenges are faced in each stage of the VLE system implementation?*; and *who are the stakeholders involved in each stage of the VLE system implementation?*.

This thesis explores such underpinning issues and key elements through extensive literature search and conducting case studies. An extensive literature review of the available e-learning approaches and practices was conducted (presented in Chapter 2), which achieves the first objective of this research (Objective 1: Review the available e-learning approaches and practices in order to gain an understanding of the state-of-the-art of e-learning practice in academia). Then another extensive literature review and analysis of existing frameworks and models was conducted (presented in Chapter 2), which achieves the second objective of this research (Objective 2: Identify good practices in VLE system implementation through conducting extensive literature review about existing frameworks). This led to the identification of the key elements of VLE system implementation and mapping them to build a conceptual framework (presented in Chapter 3). This conceptual framework not only encapsulates various key elements of a VLE system implementation framework but also depicts interrelations and interactions among them. These key elements are: stages, processes, critical success factors (CSFs) considered, challenges (CLG) faced in each process, risks associated, stakeholders (SHs) involved in each stage, and various tools, technologies, and methods integrated with a VLE system. These elements provide a deeper understanding of the fundamental issues and success factors underlying the successful implementation of a VLE system, which achieves the third objective of this research (Objective 3: Identify the key elements of VLE system implementation, then conduct mapping among them to develop a conceptual framework). The conceptual framework required validation by empirical data that was collected from the fieldwork effectively through conducting two case studies covering different levels of detail: firstly, at the national level (various UK universities); and secondly, at the local level (a London-based university). The National Level Case Study provided an overview of the current state-of-the-art of various VLE system implementations in UK universities; whereas the Local Level Case Study provided a rich, detailed insight into the implementation of a new VLE system with complex relationships and processes at a London university. The case studies (presented in Chapter 5) captured different perspectives through the involvement of multiple stakeholders including decision makers, e-learning experts, VLE system implementation team, academic staff members, and students. This enabled obtaining an in-depth analysis during the end-to-end VLE system implementation in order to validate and refine the conceptual framework, which achieves the fourth objective of this research (Objective 4: Identify good practices in VLE system implementation in HEIs through investigations in primary data collection to validate and refine the conceptual framework). Consequently, a comprehensive framework is proposed covering the key technical and pedagogical aspects of the VLE system implementation, comprising of twelve fundamental stages and forty-five processes that the HEIs need to apply in order to successfully implement the VLE system. The proposed framework (presented in Chapter 6) can be used by any HEI considering the fact that it is customizable, general, with the goal of implementing the VLE system successfully, as well as establishing innovative approaches to pedagogical and working practices. The proposed framework suggests putting together a VLE system implementation plan that would result in effective uptake of technologies, which improves student experience by incorporating e-learning effectively into the teaching and learning process. Also, staff members are strongly encouraged to undertake several personal development and VLE training workshops on pedagogic design, content development, and accessibility in order to develop their understanding of the VLE system. Moreover, it is extremely important to make the system easy to use, which will help to enhance and support the learning process. The proposed VLE implementation framework demonstrates that there is a systematic way to approach successful implementation that can accommodate the needs of the individuals within an institution, whilst making a positive impact on everyday working practices in HEIs. It also demonstrates that the entire VLE system implementation, end-to-end, can be structured and managed to some detail; thus achieving the fifth objective of this research (Objective 5: Propose the revised comprehensive framework for the good practice that could enable successful implementation of VLE system in HEIs). The proposed framework could facilitate an effective VLE system implementation in HEIs, which is likely to yield a positive impact on student learning, improved teaching practices, and return on the institution's investment. Table 7-1 presents the mapping of the various research objectives to the chapters of this thesis.

Objectives	*Chapters*
1. Review the available e-learning approaches and practices in order to gain an understanding of the state-of-the-art of e-learning practice in academia	Achieved in Chapter 2 where an intensive literature review of the available e-learning approaches and practices was conducted; different types of e-learning systems were discussed and their benefits and capabilities were highlighted, focusing on VLE system as the main e-learning system in academia
2. Identify good practices in VLE system implementation through conducting extensive literature review about existing frameworks	Achieved in Chapter 2 where an extensive literature review and analysis of existing frameworks and models was conducted
3. Identify the key elements of VLE system implementation, then conduct mapping among them to develop a conceptual framework	Achieved in Chapter 2 and 3, where an extensive literature review and analysis of existing frameworks and models was conducted. This led to the identification of the key elements of VLE system implementation and mapping them to build a conceptual framework (presented in Chapter 3). The conceptual framework for the VLE system implementation in HEIs presented considering the good practices and identifying or exploring related issues. The conceptual framework encapsulates the various key elements and depicts interrelations and interactions among them.
4. Identify good practices in VLE system implementation in HEIs through investigations in primary data collection to validate and refine the conceptual framework	Achieved in Chapter 5, where validation of the conceptual framework was achieved with empirical data collected from the fieldwork, effectively through conducting two case studies covering different levels of detail
5. Propose the revised comprehensive framework for the good practice that could enable successful implementation of VLE system in HEIs	Achieved in Chapter 6, where a comprehensive framework was proposed covering the key technical and pedagogical aspects of the VLE system implementation, comprising twelve fundamental stages and forty-five processes that HEIs need to apply in order to successfully implement VLE system

Table 7-1 Accomplishment of Objectives

This research highlights that VLE system implementation in HEIs is not merely a project, but an initiative with an underlying vision of a long transformative process, rather than just moving one VLE system and replacing it with another. Therefore, continuous support from senior management at the school, department, and central levels is one of the most important CSFs of VLE system implementation. The involvement of top management appears to have a positive impact on VLE system implementation. A key challenge faced is the lack of usability, which could be due to the system being not easy to use or is not user-friendly. It is extremely important to make the system easy to use, thus helping to enhance and support the learning process. A number of advanced tools and technologies could be used to create a fully personalised learning environment and enhance learning and teaching with a flexible, customizable, robust, and easy to use VLE system. Since this research also considers the student’s perspective, the findings from this research indicate that the VLE systems are often poorly run and students are not always offered trainings on using them. Thus, findings from this research indicate students’ preference as flexibility in learning. Moreover, several academic staff members need better ICT training, which implies that fostering staff members knowledge with digital literacy in TEL strategy is one of the good practices in VLE system implementation. The influence of VLE systems on learning practices in HEIs appears to be a reflection of the level of VLE related professional development in that institution. A higher level of content, delivery and service could be achieved by anticipating the needs of the student and considering what motivates them since they are the most important stakeholders of VLE system implementation.

7.3 Research Contribution

Implementing VLE systems in HEIs is a challenging undertaking and requires consideration of technical, pedagogical and institutional aspects. This can be encapsulated in a comprehensive framework that can be used as a guideline for HEIs for VLE system implementation, involving a structure of putting the system in place. This study contributes to the body of knowledge on IS in HEIs. The main contribution of this research is as follows:

- Proposed a good-practice framework for VLE system implementation in HEIs.

The key contribution of this research is the proposed good-practice-in-context framework that can be used as a tool to assist or guide HEIs to implement VLE system successfully. The proposed framework is built through validation and refinement of the conceptual framework using real experiences from good practices (empirical data), thus making it a practice-based framework. Moreover, the proposed framework is a holistic and comprehensive guide including details and easy-to-follow sequenced stages for the implementation of VLE system in HEIs; it also presents mappings of stages and corresponding processes with critical factors that need to be considered in a specific stage or process and identifies interactions among various key elements. Additionally, the proposed framework identifies the challenges faced and stakeholders involved in each stage of the VLE system implementation and highlights associated risks. Furthermore, it considers organisational, technological, and pedagogical aspects of VLE system implementation and considers different stakeholders' perspectives, most importantly students and staff members.

Other contributions of this research can be summarized as follows:

- Conducted an extensive literature review

For the purpose of conducting an extensive literature review, the secondary data was collected from diverse resources, including various international publications related to e-learning system implementation.

- Identified the research gap

The importance of this study is highlighted by introducing the need for developing a comprehensive framework, which can work as a guideline for the implementation of VLE systems in HEIs.

- Identified key elements of VLE system implementation

This research makes a significant contribution to the body of knowledge by offering a deeper understanding and identification of various key issues underpinning VLE system implementation, considering organisational, pedagogical, and technical aspects elicited from the current good practices.

- Building a conceptual framework from the literature

This research extends and builds on the existing frameworks of e-learning implementation, and a new improved conceptual framework is built consisting of various key elements that are identified through extensive literature review and analysis. Moreover, key elements are mapped to highlight interrelationships among them. The identified key elements such as various CSFs, CLGs and SHs address the follow-up questions of this research, as mentioned earlier.

7.4 Research Implications

Based on the research contributions mentioned in the previous section, the research findings are useful for HEIs, students, e-learning practitioners or academic staff members, VLE providers and researchers. The proposed framework will benefit the HEIs in terms of providing guidelines and recommendations in order to implement VLE systems successfully from end to end. The proposed good-practice framework presented in Chapter 6 is structured to be easy-to-follow and is customisable according to different HEI needs; whether the institution is preparing for VLE system implementation or is already in the process of implementation. Using the proposed framework, HEIs could identify the stage they are currently in, and then follow the process associated with this specific stage considering the specific CSFs. Also, the proposed framework could help the HEIs in choosing suitable stakeholders that are needed to be involved in each stage of the VLE system implementation. Since the proposed framework also identifies the challenges that could be faced in each stage, knowing these will enable the HEIs to avoid or be prepared to deal with them. Moreover, the risks associated with VLE system implementation are permeating the entire framework, which the HEIs need to consider during the VLE system implementation.

Academic staff members and students would greatly benefit from the application of the proposed framework in HEIs as it considers their perspectives by promoting their involvement in VLE system implementation in different stages such as gathering requirements, pilot study, formative evaluation and training. The proposed framework encapsulates the staff members and students' expectations from VLE system, difficulties faced, as well as their perspectives in terms of VLE system functions or features that are required to support the teaching and learning process. Moreover, it considers the support and help required by the academic staff members and students for using a VLE system thus making it more useful and adaptable.

VLE system providers would benefit from this framework as it considers difficulties and limitations of VLE systems from the perspectives of the key end-users (staff members and students) thus helping the providers to avoid such limitations. The proposed framework would also enable them to meet end-user expectations, thus leading to an increased usability of their system.

The proposed good-practice framework has implications also for the e-learning researchers since it comprises various key elements of the VLE system implementation, which can be further investigated and built upon by other researchers in the field of e-learning implementation in general or VLE specifically. The proposed framework makes a significant contribution to the body of knowledge and serves as a basis for further research.

7.5 Recommendations and Insight for Good Practices of VLE System Implementation in HEIs

This research explores the good practice of VLE implementation and draws on different HEI experiences to make recommendations based on the most successful approaches. The concept of good practice does not reflect that there is one way of implementing VLE and a single set of exact steps needed to be followed; however, some recommendations and guidelines to consider are very much apparent from the findings, and they consistently manifest their relevance. Thus this research makes a number of recommendations and guidelines for HEIs to implement VLEs successfully and offer high quality provision that makes effective use of a VLE ensuring that student needs are met. Moreover, these recommendations are in line with the TEL strategy as well as the good practices of VLE system implementation in HEIs:

1. The VLE system implementation needs to be aligned with the institutional TEL strategy. A significant part of TEL strategy entails incorporating good practices, where the focus has moved from contents to activities, which in turn encourages the application of technology in pedagogical practices and promotes educational activities.

2. HEIs need to conduct adequate analysis and review of the current situation, including institutional, sector and end-user analysis, and gathering adequate stakeholder requirements.

3. Since involving stakeholders has been the most frequently identified good practice, HEIs need to put in place a user engagement strategy, involve related stakeholders, and have a consultative approach, thus ensuring that people feel involved in the VLE system implementation.

4. HEIs need to identify existing good practices in education and consult other universities to obtain virtual experiences or success stories.

5. HEIs need to recognise seriously that students are at the core of the learning process and are identified as one of the most important stakeholder; therefore, student's involvement in VLE system implementation is crucial in terms of gathering requirements, participation in pilot studies, usability testing, training and continuous evaluations.

6. It is the academic staff members that actually form the learning environment and are the main driver for an effective use of a VLE system. It is important to have a purposeful and useful intervention of technology in teaching and learning.

7. Since the pedagogical use of VLE systems can only be applied by the academic staff members, it is therefore important to acknowledge staff

members' engagement and commitment in order get them involved throughout the VLE system implementation.

8. HEIs need to provide sufficient training to staff members and students.

9. In order to raise the standards of the VLE systems, HEIs need to continually consider quality assurance, share experiences and good practices internally or externally, capture end-user feedback by focusing on user experiences, meet the learner needs, and maintain student satisfaction.

10. The success of VLE system implementation significantly depends on how it is used and integrated with other useful tools and technologies, such as e-assessment and other communication tools.

11. HEIs need to enhance the learning experience; one way of achieving this is by promoting flexibility in learning.

12. HEIs need to foster the staff members' digital literacy in terms of encouraging purposeful interventions of technology in various pedagogical practices and enhance their understanding about the VLE system usage. HEIs should follow such an approach, where pedagogy comes first and then a suitable technology is selected; this will help in achieving the learning outcomes.

7.6 Research Limitations

This study, as with any other research attempt, is limited in certain respects. Firstly, the Local Level Case Study was not extensive; a reasonably-sized survey sample was obtained due to the busy schedule of staff members and relatively large number of unmotivated students, although the questionnaire was distributed online to be more convenient and easy to answer. This was supported by the use of different data collection methods (interviews, observations and documents analysis). Another limitation for this research was that the enormous amounts of data obtained from both case studies with multiple data collection methods was a challenge, which required extra time in terms of organising and analysing it. Since most interview questions were mainly open-ended, it led to distracted discussions with the interviewees on more general topics, resulting in approximately twenty-one hours of interviews; these were recorded, then transcribed, filtered and double-checked to ensure data accuracy, and eventually carefully analysed. A similar process was followed for the surveys, observations and documentary analysis. Major difficulties were faced while booking interview appointments with the academic staff members due to their hectic schedules, and appointments were cancelled many times. In order to overcome this challenge, some interviews were organised via telephone calls or online audio chats out of office hours. Despite these potential limitations, the empirical findings enabled the researcher to gain insights into VLE system implementation.

7.7 Future Research

In the future, VLEs are expected to bring added convenience, interactivity and ease of access in the learning process. Although the proposed framework is a good-practice-in-context framework built from secondary and primary data, a future extension of this research will be to actually apply and evaluate the proposed framework in an HEI preparing for VLE system implementation.

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Appendices

Appendix A: Analysis of various e-learning best practice projects

E-learning best practice projects	*Key features*
E-dysgate: edysgate (www.edysgate.org) is an interactive learning environment to train the sensory perception of young dyslexic adults (Bruck, 2010)	• 5 different languages • Address seven areas of vocational skills development • Different sense areas; auditory discrimination, auditory memory, auditory sequence, visual discrimination, visual memory, visual sequence, and spatial position
Lingorilla: a video community where language enthusiasts from across the globe can brush up on their language skills (Bruck, 2010)	• State of the art e-learning website • Combines the best of all languages learning technology; e.g. textbook, educational film
Cell- Centre for Experiential Learning: established to offer training solutions in order to radically innovate conventional CME refresher courses for medical practitioners (Bruck, 2010)	• State-of-the art technology, skills, content and learning methods converge to make training solutions effective. • Creating an absolutely unique learning environment, where the excitement of being involved in a new and meaningful experience favours the learning and intake of information. • Users are “immersed” in highly realistic simulations enabling more powerful learning mechanisms • Radically transforms conventional continuing education and refresher courses • Introduces comprehensive cutting edge e-learning facilities using the added value of digital technologies for the needs of e-health
Rural Life Skills Development Project (Bruck, 2010)	• The result has been a greater and deeper appreciation and understanding • It demonstrated the huge potentialVR offers as a means for effective transfer of skills and knowledge at grassroots level.
ChinesePod – Praxis Language China: a language training service with hundreds of thousands of users, it publishes a new lesson seven days per week (Bruck, 2010)	• It serves the needs of each individual learner to acquire knowledge and skills • Features more than 1000 lessons and extra downloads

E-learning best practice projects	*Key features*
Brevard Community College (Cocoa, FL), established: 1960, enrolment: 14,732 (IHEP, 2000)	• Offering distance education telecourses in 1974 • Two entire associate's degree programs can be completed either online or through telecourses, as well as a number of individual courses • Focusing on increasing student retention in distance classes • FIPSE that is focused on faculty training and development in order to impact positively student learning.
Regents College Albany, NY, established: 1970, enrolment: 17, 358 (IHEP, 2000)	• Focused on working adults • Provides an independent study program for various degrees • In February 1999 regents was awarded a Meritorious Course Award from the University Continuing Education Association in recognition of its theoretical frameworks of nursing practice course
University of Illinois at Urbana-Champaign Urbana, Ill., established: 1867, enrolment: 36,019 (IHEP, 2000)	• One of three participants in the University of Illinois Online (along with the Springfield and Chicago campuses), offering 20 degree or certificate programs over the internet, with more in development
University of Maryland University College, College Park, Md., established: 1947, enrolment: 13,786 (IHEP, 2000)	• With experience in distance education that spans more than a quarter century, UMUC began offering courses over the Internet in autumn 1997 and currently offers 14 bachelor's and 10 master's degree programs online • UMUC was awarded the University Continuing Education Association's Award for Innovative Distance Education in 1998 and 1999, and was included in Forbes Magazine's list of the top 20 "cyber universities" in 1997.
Utah State University, Logan, Ut., established: 1888, enrolment: 21,234 (IHEP, 2000)	• Involved in various forms of distance education since 1911 • USU has also been selected as a participant in the Learning Anytime Anywhere Partnerships program created in the 1998 reauthorization of the Higher Education Act

E-learning best practice projects	*Key features*
Weber State University, Ogden, UT., established: 1889, enrolment: 14,613 (IHEP, 2000)	• Began offering independent study courses in the early 1990s, and in 1995 conceptualized an online campus • Over 70 independent study courses offered in more than 20 disciplines • Now enrols more than 2000 students and received an innovation in distance education award from the university continuing education association in 1998
elene-TT– teacher training and the innovative use of ICT in higher education (Stansfield et al., 2009)	• European collaboration for improving teacher training (Arnold et al., 2005) • Improving the ability of the teachers to make pedagogical use of ICT (Arnold et al., 2005). • Brings together a number of HEIs who may be considered front-runners in the field (Arnold et al., 2005). • Covering a wide range of ICT-based learning contexts from total distance e-learning to on-campus support and mobile solutions (Arnold et al., 2005)
elene-TLC - preparing universities for the next generation of students (Stansfield et al., 2009)	• Integration of the needs and expectations of net generation students in higher education learning • Enabling teachers and students to make the best possible use of ICT in higher education • Establishing elene teaching and learning service centre
elene-EE - economics of e-learning (Stansfield et al., 2009)	• Integrating Web 2.0 tools in elene-EE dissemination • Several dissemination products and services were developed for elene-EE project
Extending the applicability of ASK (assignment survival kit) to support a wider range of learners in Staffordshire University (Mark Childs Report, 2011)	• The whole website can be adopted by anyone who wishes to use it. It is covered by a creative commons licence

Appendix B: Mapping of e-learning system implementation stages with corresponding processes and CSFs from the literature

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
Review and analysis (McPherson and Nunes, 2008; Saeedikiya et al., 2010)	Review and analyse current situation (Aimard, 2007: Engelbrecht, 2003; MacLean and Scott, 2011; Quinsee and Bullimore, 2011)	• Availability of virtual experiences or success stories (Bruck, 2010) • Best practices are identified (DFES, 2003; Stansfield et al., 2009)
	Identify key stakeholders and their responsibilities (Aimard, 2007; DFE, 2004)	• Involve all stakeholders including key external decision makers (Aimard, 2007; Bruck, 2010; DFES, 2003; Macdonald et al., 2001; MacLean and Scott, 2011; Sharma et al., 2010; Stansfield et al., 2009; Quinsee and Bullimore, 2011) and form partnerships (DFE, 2004; Sarker et al., 2013)
Institutional analysis (Sharma et al., 2010; Sharpe et al., 2006; Wild et al., 2002)	Define vision, mission, and policy of the institution (Aimard, 2007; Alexander, 2001; DFE, 2004; Engelbrecht, 2003; Garrison and Kanuka, 2004; Ismail, 2002; Stansfield et al., 2009)	• Clear vision and strong leadership (Stansfield et al., 2009) • Clear institutional direction and policy (Collis and Moonen, 2001; Garrison and Kanuka, 2004) • Clear goals and objectives (Doherty, 2010) • Integrated business planning and e-learning strategies (Sharma et al., 2010) • Drawn on a broad range of institutional experiences (Beastall and Walker, 2007) • Key organisational strategies embrace e-learning environment (Beastall and Walker, 2007; Collis and Moonen, 2001; DFE, 2004; Stansfield et al., 2009) • Establish a human resource strategy for stakeholders' engagement and skills development (Alhogal and Mirza, 2011; McPherson and Nunes, 2008) • Consider learner-centred experience (Beastall and Walker, 2007; Diamond and Irwin, 2011; Hoidn, 2006; DFE, 2004; DFES, 2003; Motschnig-Pitrik, 2004)

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
	Investigate technological infrastructure and change management (Beastall and Walker, 2007; Engelbrecht, 2003; Garrison and Kanuka, 2004; IHEP, 2000; Macdonald et al., 2001; Sharma et al., 2010; Welsh et al., 2003; Wild et al., 2002)	• Commitment and active support from senior management (Beastall and Walker, 2007; DFES, 2004; Doherty, 2010; Gramp, 2013; McGill et al., 2014) • Consider adequate provision of resources including appropriate it support and help systems (Beckton, 2009; DFES, 2004; Doherty, 2010; MacLean and Scott, 2011;McPherson and Nunes, 2008; Sharma et al., 2010; Stansfield et al., 2009; Welsh et al., 2003) • Consider organizational, cultural, and employee attitude (Alhogal and Mirza, 2011; Beastall and Walker, 2007; Collis and Moonen, 2001; Doherty. 2010; Wild et al., 2002; Shachar and Neumann, 2003) • Proactive management approach (Beastall and Walker, 2007; Stansfield et al., 2009) • Focus on the enhancement of students' learning experience rather than the adoption of technology (Beastall and Walker, 2007)
	Consider equipment: hardware and software (Aimard, 2007; Engelbrecht, 2003; DFES, 2003)	• Availability of information about preferred learning styles (DFES, 2004; McPherson and Nunes, 2008;) • Availability of information about learning support requirements (DFES, 2004)
	Estimate implementation costs and sustainability; conduct cost/benefit analysis (DFES, 2003; Engelbrecht, 2003; Sarker et al., 2013; Stansfield et al., 2009)	• Reduce the total cost of education with cost-effective and sustainable online learning management system (DFES, 2003; Engelbrecht, 2003; Macdonald et al., 2001; Sarker et al., 2013; Stansfield et al., 2009; Welsh et al., 2003) • Consider the key elements including effective, transparent business model, tangible and intangible benefits, direct and indirect costs (Macdonald et al., 2001; Stansfield et al., 2009) • Adequate funding for staff development (DFE, 2004) • Provide better return on investment (Stansfield et al., 2009) • Consider availability of e-learning development grants (Beastall and Walker, 2007; Gramp, 2013)
	Conduct risk analysis (Stansfield et al., 2009)	• Appropriate risk assessment (Beastall and Walker, 2007; DFE, 2004)

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
	Analyse pedagogical choices (Aimard, 2007; Bonk and Cummings, 1998; Engelbrecht, 2003)	• Careful consideration of the underlying pedagogy, such as virtual or blended learning experience (Aimard, 2007; Govindasamy, 2002; Stansfield et al., 2009; Snae et al., 2008; Welsh et al., 2003) • Consider distance education tele-courses (IHEP, 2000) • Consider schemes of work and lesson appraisal documents to encourage the use and assessment of e-learning in curriculum delivery (Alexander, 2001; Beastall and Walker, 2007; DFE, 2004) • Flexible learning routes considering learner preferences and adapt to their progress (Alexander, 2001; Macdonald et al., 2001; MacLean and Scott, 2011; Quinsee and Bullimore, 2011) • Availability of alternative learning experiences for learners with disability (DFES, 2004) • Consider enhancing learning with technology (Stansfield et al., 2009; Wentling et al., 2000) • Clear pedagogical goals and objectives (Mishra, 2002) • Personalise the web experience (Beastall and Walker, 2007; Bonk and Cummings, 1998; Quinsee and Bullimore, 2011) • Support an active and creative learning environment (DFES, 2003; Macdonald et al., 2001)
	Conduct market research (DFES, 2003; Engelbrecht, 2003; Macdonald et al., 2001; Snae et al., 2008; Stansfield et al., 2009)	• Effective market research (Stansfield et al., 2009) • Consider embedded strategies (Stansfield et al., 2009) • Market the distance learning programs internally and externally (Wentling et al., 2000)
End-user analysis (Singh, 2003)	Perform needs analysis (Doherty, 2010; Engelbrecht, 2003; MacLean and Scott, 2011) and propose solutions (MacLean and Scott, 2011)	• Effective partnerships with all stakeholders (Aimard, 2007; Bruck, 2010; DFES, 2003; Macdonald et al., 2001; MacLean and Scott, 2011; Stansfield et al., 2009) • Test and evaluate user needs or requirements (Snae et al., 2008; Stansfield et al., 2009) • Peer reviewed (Stansfield et al., 2009; e.g. 2010) • Effectively manage and support diversity (Macdonald et al., 2001; Stansfield et al., 2009;

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
		Wentling et al., 2000)
	Perform instructor analysis and analyse the experience of web designers (Aimard, 2007; Alexander, 2001; Engelbrecht, 2003, p. 43)	• Formal recognition of teacher's role (McGill et al., 2014; McPherson and Nunes, 2008) • Address personal and professional capabilities (MacLean and Scott, 2011; McPherson and Nunes, 2008) • Consider new form of teaching and learning (DFES, 2003)
	Perform learner identification and analysis (Govindasamy, 2002; Ismail, 2002; MacLean and Scott, 2011) including student profiles (Engelbrecht, 2003) and student needs (Beastall and Walker, 2007)	• Proper identification of learners (MacLean and Scott, 2011) • Intercultural dialogue (Stansfield et al., 2009) • Flexible learning routes considering learner preferences and needs (Beastall and Walker, 2007; DFES, 2003; Ismail, 2002; MacLean and Scott, 2011; Wentling et al., 2000)
	Hold consultations with staff and students (Quinsee and Bullimore, 2011)	• Hold a series of workshops, focus groups, surveys and consultations with staff and students (Quinsee and Bullimore, 2011) • Wider faculty engagement with teaching and learning technologies (Alhogal and Mirza, 2011; Doherty, 2010)
Decision making (Saeedikiya et al., 2010)	Make decision based on the analysis conducted (Doherty, 2010)	• Involve academic staff members acting as subject matter experts (Doherty, 2010) • Consultation with other stakeholders (e.g. head of school) (Doherty, 2010) • Consider financial support for the on-going development/operation (Beastall and Walker, 2007; Doherty, 2010; McGill et al., 2014) • Consider financial benefit (McGill et al., 2014; Wang et al., 2007) • Consult suppliers to explore how technology could support learning (Quinsee and Bullimore, 2011)
Planning and	Assigg project champion	• Senior level VLE project champions are identified (Beastall and Walker, 2007; Stansfield

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
preparation (Sharma et al., 2010; Sharpe et al., 2006)	(Beastall and Walker, 2007; Doherty, 2010; Stansfield et al., 2009) and the VLE project implementation group or the key change agents (Beastall and Walker, 2007; Sharma et al., 2010; Sharpe et al., 2006)	et al., 2009) • Champion with clear vision and strong leadership (Beastall and Walker, 2007; Stansfield et al., 2009) • Pro-active management (Stansfield et al., 2009) • Effective partnerships with all stakeholders (Stansfield et al., 2009) • Obtain local field manager commitment (Wentling et al., 2000). • Use of bespoke agile processes for proper planning and preparation (Sarker et al., 2013) • Regular interactions with external LMS community and vendor (Sarker et al., 2013; Sharma et al., 2010) • Availability of sponsorship for the implementation (Sharma et al., 2010) • Communicating well and readjusting work accordingly (Quinsee and Bullimore, 2011) • Ensure collective responsibility and shared interests to achieve outcomes (Quinsee and Bullimore, 2011) • Plan but flexibly (Quinsee and Bullimore, 2011)
	Assign teamwork, roles and responsibilities (Doherty, 2010; Stansfield et al., 2009)	• Involve the “right” people from each school, such as academics, for communication and buy-in (Beastall and Walker, 2007; Doherty, 2010; Quinsee and Bullimore, 2011) • Involvement of staff development manager and ILT champions or e-guides (DFE, 2004; Gramp, 2013) • Determination of completion date for development work (Doherty, 2010) • Use on-site coordination (Wentling et al., 2000). • Address realistic concerns right at the start of the planning process (Sharma et al., 2010) • Consider and understand organisational politics (Quinsee and Bullimore, 2011)
	Planning for sustainability (Gunn, 2010; McGill et al., 2014; Sharpe et al., 2006; Stansfield et al., 2009)	• Effective and realistic business model (Sharma et al., 2010; Sharpe et al., 2006; Stansfield et al., 2009) • Availability of on-going financial support (Garrison and Kanuka, 2004; Gunn, 2010; McGill et al., 2014 Stansfield et al., 2009)

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
		• Consider maturity or stability of technology used (McGill et al., 2014) • Involving stakeholders in development and support of e-learning initiative (McGill et al., 2014)
	Departments prepare plans for wider adoption of e-learning platform (Beastall and Walker, 2007)	• Create broad awareness of the overall strategic aim among internal stakeholder in the institution (Beastall and Walker, 2007; Doherty, 2010; Sharma et al., 2010) • Support from all the internal stakeholders (Doherty, 2010; Sharma et al., 2010)
Design (Khan, 2004; Saeedikiya et al., 2010)	Design the system itself (Khan, 2004; Motschnig-Pitrik, 2004; Saeedikiya et al., 2010), if any	• For large-sized e-learning projects, services of specific interface designers and evaluation specialists are critical (Khan, 2004) • Ensure adaptability, customizability and usability of e-learning systems (McPherson and Nunes, 2008) • Consider user-centred design by allowing learners to make choices (Bonk and Cummings, 1998; Stansfield et al., 2009)
	Design web interface (Bruck, 2010; MacLean and Scott, 2011; Welsh et al., 2003; Wentling et al., 2000)	• Clear, easy, flexible, and attractive interface (Bruck, 2010; Collis and Moonen, 2001; Macdonald et al., 2001; MacLean and Scott, 2011; McGill et al., 2014; Quinsee and Bullimore, 2011; Welsh et al., 2003) • User-friendly interface with communication tools for interactivity (Bruck, 2010; Engelbrecht, 2003) • High usability user interface (Macdonald et al., 2001) • Consistent, consolidated and clear screen design (Wentling et al., 2000) • Engage effectively with all stakeholders (Aimard, 2007; Bruck, 2010; DFES, 2003; Macdonald et al., 2001; MacLean and Scott, 2011; Stansfield et al., 2009)
	Define instructional objectives (Beastall and Walker, 2007; Govindasamy, 2002; Ismail, 2002)	• Clearly identified course aims and learning outcomes (Alexander, 2001; e.g. 2010; IHEP, 2000; MacLean and Scott, 2011) • Close consultation with stakeholders (Aimard, 2007; Bruck, 2010; DFES, 2003; Macdonald et al., 2001; MacLean and Scott, 2011; Stansfield et al., 2009)

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
Course and content design (Khan, 2004; Wild et al., 2002)		• Emphasize on cognitive leaning outcomes (Welsh et al., 2003; e.g. 2010) • Provide incentive scheme, performance indicators, institutional recognition for career development path (Aimard, 2007; Stansfield et al., 2009)
	Understand and apply relevant pedagogical standards and specifications (DFES, 2003; IHEP, 2000; MacLean and Scott, 2011; Stansfield et al., 2009)	• Consider clear quality standards (DFES, 2003; Stansfield et al., 2009) • Use research skills to investigate subject (MacLean and Scott, 2011) • Consider to impart less complex knowledge (Welsh et al., 2003) • Periodic review of instructional materials to ensure they meet program standards (IHEP, 2000)
	Select and develop pedagogic model or instructional design strategy (Aimard, 2007; DFES, 2003; Govindasamy, 2002; MacLean and Scott, 2011; Stansfield et al., 2009; Wentling et al., 2000; Wild et al., 2002)	• Pedagogy supports and enhances students' learning experience (Beastall and Walker, 2007; Bonk and Cummings, 1998; McPherson and Nunes, 2008); Stansfield et al., 2009) • Promote interactive learning including e-learning applications, activities, and tools (Bruck, 2010; Engelbrecht, 2003; Ghaleb et al., 2006; Govindasamy, 2002; Lewin et al., 2011; MacLean and Scott, 2011; Stansfield et al., 2009; Welsh et al., 2003; Wentling et al., 2000; Wild et al., 2002) • Comprehensive, exciting, and stimulating online learning environments with high quality e-content (Bruck, 2010; Stansfield et al., 2009; Welsh et al., 2003) • Discuss and debate ideas and receive feedback (Mishra, 2002; Snae et al., 2008) • Lessons use activities that are relevant, timed, interesting (MacLean and Scott, 2011) • Consider multi-lingual solutions (Stansfield et al., 2009) • Consider enabling coordinated teamwork (MacLean and Scott, 2011; Stansfield et al., 2009)
	Manage course including contents (Aimard, 2007; Govindasamy, 2002; MacLean	• Contents clearly structured and organised (MacLean and Scott, 2011) • Appropriate, stimulating and motivational content (Bruck, 2010; Macdonald et al., 2001; Stansfield et al., 2009; Welsh et al., 2003)

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
	and Scott, 2011)	• Content relevant to course aim, contexts, interest, personal goals of learners (MacLean and Scott, 2011) • Contents are accurate and up-to-date (MacLean and Scott, 2011) • Content are comprehensive, authentic, and researched (Engelbrecht, 2003) • Clear instructions and adequate support (Ismail, 2002; MacLean and Scott, 2011; Wentling et al., 2000) • Appropriately organised workload (MacLean and Scott, 2011) • Consider outlining course content with listing general instruction topics (Govindasamy, 2002) • Clear expectations and task structure identifying the tasks learners should be able to perform (Bonk and Cummings, 1998; Govindasamy, 2002) • Courses require students to engage in analysis, synthesis, and evaluation (Beastall and Walker, 2007; IHEP, 2000)
	Select and apply e-learning technologies for particular pedagogical purposes (Doherty, 2010; Hoidn, 2006; MacLean and Scott, 2011; Wentling et al., 2000)	• Availability of technical assistance in course development (IHEP, 2000; Beastall and Walker, 2007) • Consider affordability (McGill et al., 2014; McPherson and Nunes, 2006) • Enable 'on-demand' access to all lessons (Beastall and Walker, 2007; Bruck, 2010; Macdonald et al., 2001) • Consider learner's mobility, such as enabling study on the go (Bruck, 2010; Wang and Shen, 2012) • Focus on convenience and personalisation (Bruck, 2010; Macdonald et al., 2001; Shachar and Neumann, 2003; Welsh et al., 2003) • Consider collaborative learning (Beastall and Walker, 2007; Smith, 2011) • Use learner web explorations (Bonk and Cummings, 1998) • Consistency with pedagogical approaches (McPherson and Nunes, 2006; McGill et al., 2014)

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
	Design content evaluation studies (MacLean and Scott, 2011) and produce methodological recommendations for improvement of the curriculum (Bruck, 2010)	• All modules have evaluation strategy (Beastall and Walker, 2007; e.g. 2010; MacLean and Scott, 2011) • Provision of up-to-date andaccurate information for managers on progress of course teams (DFES, 2004) • Encourage the ownership of digital spaces (Quinsee and Bullimore, 2011; Gramp, 2013) • Consider collaborating with educational experts (Bruck, 2010) • Comprehensive study guides for students (IHEP, 2000; MacLean and Scott, 2011)
	Select from and apply a range of assessment techniques (MacLean and Scott, 2011; Snae et al., 2008) for regular evaluation of learner (Macdonald et al., 2001)	• Mechanisms for providing useful and timely feedback on students' work (Alexander, 2001) • Appropriate and fair assessments with criteria (Macdonald et al., 2001; MacLean and Scott, 2011) • Assessments with clear descriptions of their nature, time, and location (Bonk and Cummings, 1998; MacLean and Scott, 2011) • Careful design of efficient e-assessment format (DFES, 2003; DFE, 2004). • Organisation-wide strategy for employing e-assessment in order to address issues of security, to retain rigour and to protect personal data (DFE, 2004)
Development and deployment (IEEE, 2001)	Actual build of the software (Motschnig-Pitrik, 2004), if any, and conduct rapid application development (Stansfield et al., 2009)	• A high-level architecture (IEEE, 2001; Motschnig-Pitrik, 2004) • Consider the time available for the development (Gunn, 2010; McGill et al., 2014) • Easily modifiable platform (Ismail, 2002) • Formal recognition of developer's role (Alexander, 2001; McGill et al., 2014) • Stability and reliability of the technology (Alexander, 2001; IHEP, 2000; McGill et al., 2014; McPherson and Nunes, 2006; Sarker et al., 2013; Wentling et al., 2000) • Consider high availability so that the system is always available for use (Sarker et al., 2013) • Address maintenance and accessibility issues (Beastall and Walker, 2007; MacLean and Scott, 2011) • Consider initial diagnostic assessment before commencement of the course (DFE, 2004)

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
		• Efficiently build and update of contents online (Stansfield et al., 2009) • Access and navigation supported by clear and consistent signposting (MacLean and Scott, 2011) • Integrated for multiple user interaction, content management, and content display (Bruck, 2010; Ghaleb et al., 2006) • Diversified learning platform including digital content library (Bruck, 2010; Stansfield et al., 2009)
	Installation and customise vendor product (Sarker et al., 2013)	• Customised state-of-the-art installation considering standardization in quality and evaluation (Bruck, 2010; DFES, 2003; Stansfield et al., 2009;)
	Know and implement relevant legislation for accessibility, plagiarism, copyright and intellectual property right issues, security and confidentiality (Alexander, 2001; Beastall and Walker, 2007; DFES, 2003; Doherty, 2010; MacLean and Scott, 2011)	• System security is in place (IHEP, 2000; Stansfield et al., 2009) • Maintenance agreements are in place (Stansfield et al., 2009) • Adoption of open-source technologies (Stansfield et al., 2009) • Resources used are clearly referenced (MacLean and Scott, 2011) • Management of organisational resources through electronic tracking tools (DFES, 2004)
	Interpret and write technical specifications (MacLean and Scott, 2011)	• Up-to-date LMS platform with the latest version of source code (Sarker, 2013) • Consider guidelines and resources for users (Stansfield et al., 2009; Mishra, 2002)
Formative evaluation (Khan, 2004)	Conduct pilot studies (Beastall and Walker, 2007; Govindasamy, 2002; MacLean	• Successful piloting (Stansfield et al., 2009) • Ensuring the inclusion of all stakeholders (Beastall and Walker, 2007) • Gather feedback from staff and students (Beastall and Walker, 2007)

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
Pilot study (Beastall and Walker, 2007; Govindasamy, 2002; MacLean and Scott, 2011)	and Scott, 2011)	
	Develop feedback mechanism (Snae et al., 2008; Stansfield et al., 2009; e.g. 2010)	• Provide private and public forms of feedback (Bonk and Cummings, 1998) • Rigorous self-assessment identifying weaknesses in provision (DFES, 2004; e.g. 2010) • Subject leaders and course teams responsible for self-assessment and performance targets (DFE, 2004)
	Discuss and debate ideas and receive feedback (Khan, 2004)	• Opportunities for the staff development manager to become integrated into the organisation's quality and continuing professional development schemes (DFES, 2004) • Conduct action based on reviews (Snae et al., 2008; e.g. 2010)
Review and bug fixes (Sarker, 2013)	Conduct review based on user feedback from the pilot testing (Khan, 2004)	• Analyzing users' feedback from the pilot testing and review accordingly (Khan, 2004) • Consider enhancement of existing features (Sarker, 2013)
	Continuous upgrading with notable security and bug fixes (Sarker, 2013)	• Advertise VLE service outages as early as possible (Sarker, 2013) • Document the core code changes (Sarker, 2013) • Disable service monitoring and alerting during the upgrade process (Sarker, 2013)
Integration (Bell and Bell, 2005)	Integration with mainstream programs and systems (Aimard, 2007; Beastall and Walker, 2007; Stansfield et al., 2009; Quinsee and Bullimore, 2011)	• Compatibility with other systems in the institution (DFES, 2004) • Address issues related to pedagogical practices and technological interoperability (Stansfield et al., 2009)
	Integration of new feature in the VLE (Sarker et al., 2013)	• Use combination of all media including multimedia tools, emerging digital technologies, and new media (Bruck, 2010; DFES, 2003; Hung, 2012; Khoja et al., 2002; MacLean and Scott, 2011; Mascitti et al., 2007; Mostefaoui, 2012 Welsh et al., 2003) • Consider new trends and innovative technologies (DFES, 2003; Bruck, 2010; Stansfield et al., 2009) • Use of tools with graphics and sounds (Bruck, 2010; Hung, 2012; Khoja et al., 2002;

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
		Mascitti et al., 2007; Mostefaoui, 2012; Welsh et al., 2003)
Final release and go live	Implementation of an integrated learning environment (Aimard, 2007; Ismail, 2002;)	• Ready at the beginning of the academic year (Doherty, 2010) • Adopt a bottom-up approach (Ssekakubo et al., 2011)
	Communicate and inform all stakeholders (Doherty, 2010; Khan, 2004;)	• Communicate and inform all stakeholders (Doherty, 2010) • Plans are in place for wider adoption before full availability of system (Beastall and Walker, 2007)
Training and support (Aimard, 2007; DFE, 2004; DFES, 2003; Engelbrecht, 2003; IHEP, 2000; MacLean and Scott, 2011; McGill et al., 2014; Wentling et al., 2000)	Design support systems and training programs to empower learners, tutors and course managers (Beastall and Walker, 2007; Beckton et al., 2009; DFES, 2003; MacLean and Scott, 2011; Sharma et al., 2010; Sharpe et al., 2006; Welsh et al., 2003)	• Collaborate with user groups and trainers (Bruck, 2010) • Intercultural dialogues about user's learning experience (Stansfield et al., 2009) • Well-designed instruction and training course (Sharma et al., 2010; Welsh et al., 2003) • Carefully consider issues of training design (Welsh et al., 2003) • Consider institutional, student, and faculty support (Beastall and Walker, 2007; Govindasamy, 2002; IHEP, 2000) • Foster learner engagement (Beastall and Walker, 2007; Bonk and Cummings, 1998; Collis and Moonen, 2001; IHEP, 2000; Wild et al., 2002) • Effective management of training as an organisation-wide initiative (Beastall and Walker, 2007; DFES, 2004; Wentling et al., 2000) • Consider provision of online advice, guidance and diagnostics for learner (DFES, 2003) • Initial diagnostic assessment to identify learners' on-entry it skills (DFE, 2004; IHEP, 2000)
	Conduct training activities with students and staff including staff development (Aimard,	• Effective training addressing variety of needs using various technologies (DFE, 2004; Macdonald et al., 2001; McPherson and Nunes, 2008; Stansfield et al., 2009; Welsh et al., 2003)

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
	2007; DFE, 2004; DFES, 2003; Engelbrecht, 2003; IHEP, 2000; MacLean and Scott, 2011; McGill et al., 2014; Wentling et al., 2000)	• Use of VLE for staff development by introducing them to the new VLE 's facilities (DFE, 2004) and how to save time (McGill et al., 2014) • Provision of flexible access to staff development in ILT (DFE, 2004; e.g. 2010) • IT skills audit linked to staff development programme in e-learning skills (DFE, 2004; Motschnig-Pitrik, 2004) • Use of multimedia for staff training (Bruck, 2010) • Staff training actions are support by online resource centre (Stansfield et al., 2009) • Provision of resources for academic staff including; lecture notes, course description, documents, url links, and guides and systems for mentoring and monitoring (Ghaleb et al., 2006) • Enable staff to offer more active and creative ways of learning in all subjects (DFES, 2003; Macdonald et al., 2001) • Consider external training consultant (Beckton, 2009)
	Provide institutional support (DFE, 2004; Engelbrecht, 2003; IHEP, 2000)	• Provision of any administrative or technical support (Alexander, 2001; Beastall and Walker, 2007; Beckton, 2009; Engelbrecht, 2003; IHEP, 2000; Macdonald et al., 2001; McGill et al., 2014; Ssekakubo et al., 2011; Welsh et al., 2003) • Availability of peer support and online help (Beastall and Walker, 2007; DFE, 2004; Doherty, 2010; IHEP, 2000; McGill et al., 2014; Smith, 2011; Stansfield et al., 2009; Wang et al., 2007) • Provision of resources such as guidelines, user manual, induction advice, and other documentation (Bruck, 2010; DFES, 2004; IHEP, 2000; MacLean and Scott, 2011; Stansfield et al., 2009) • Availability of communication support for the students from faculty and other students (Alexander, 2001; Beastall and Walker, 2007) • Access to, and ownership of, it equipment for both learners and practitioners (DFES, 2004) • Questions are answered accurately and quickly (IHEP, 2000)

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
Continual evaluation (Aimard, 2007; DFE, 2004; DFES, 2003; Macdonald et al., 2001; MacLean and Scott, 2011; Snae et al., 2008)	Design and apply quality assurance procedures (Aimard, 2007; Beastall and Walker, 2007; Garrison and Kanuka, 2004; MacLean and Scott, 2011; Shachar and Neumann, 2003)	• Clear quality standards (DFES, 2003; Stansfield et al., 2009; e.g. 2010) • Lessons accompanied by formative feedback (Bonk and Cummings, 1998; MacLean and Scott, 2011; Wentling et al., 2000; Snae et al., 2008) • Gauge the success from organisational, technological, pedagogical, user, and financial perspectives (Stansfield et al., 2009) • Continual or regular evaluations (Beastall and Walker, 2007; DFES, 2003; Snae et al., 2008; Stansfield et al., 2009; Macdonald et al., 2001) • Consider provision of private and public forms of feedback (Bonk and Cummings, 1998) • Use of external, impartial evaluators providing a fresh perspective in addressing key issues and evaluating the success of e-learning project (Stansfield et al., 2009)
	Carry out evaluation studies to measure e-learning system quality and effectiveness (DFE, 2004; IHEP, 2000; Shachar and Neumann, 2003; Wang et al., 2007)	• Use appropriate evaluation methodologies (DFES, 2003; Snae et al., 2008) • Identify new trends and support innovation technology (Beastall and Walker, 2007; Stansfield et al., 2009) • Design and test all tools on the e-learning module (IHEP, 2000) • Evaluation studies meet real needs (DFE, 2004; Stansfield et al., 2009) • Use mentors and apprentices for learning (Bonk and Cummings, 1998) • Consider enhancement in terms of student learning and improved academic performance (Doherty, 2010; Shachar and Neumann, 2003) • Use several methods and apply specific standards in evaluating the effectiveness of the teaching and learning process (IHEP, 2000) • Consider data about enrolment, costs, and successful/innovative uses of technology (IHEP, 2000) • Consider student satisfaction (Garrison and Kanuka, 2004; McGill et al., 2014; Shachar and Neumann, 2003; Wentling et al., 2000)
	Evaluate the success of educational content in meeting	• Appropriate and fair content assessments with criteria (MacLean and Scott, 2011) • Assess whether learners' needs are being met, and act accordingly (Beastall and Walker,

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
	student/user needs (Doherty, 2010; Snae et al., 2008; Stansfield et al., 2009)	2007; DFE, 2004) • Review is conducted by content experts (Govindasamy, 2002; e.g. 2010) • Consider content publishing workflow (Govindasamy, 2002) • Most popular contents and functions are identified (Stansfield et al., 2009)
	Conduct refinements to the technical infrastructure and learning materials as a result of feedback from staff, students and other stakeholders (Beastall and Walker, 2007; Macdonald et al., 2001; Snae et al., 2008; Stansfield et al., 2009)	• Clear technology requirements (Beastall and Walker, 2007; Stansfield et al., 2009) • Ensure inclusion of all stakeholders (Beastall and Walker, 2007; Beckton, 2009; Stansfield et al., 2009) • Clear and effective communication with all stakeholders (Beastall and Walker, 2007; Stansfield et al., 2009)
	Develop centre of excellence (Aimard, 2007; Stansfield et al., 2009)	• Accreditation and recognition for courses is obtained through partnerships with respected professional, academic organisations, and societies (Stansfield et al., 2009) • Best practices are identified and disseminated (Beastall and Walker, 2007 Stansfield et al., 2009) • Increase awareness (Beastall et al., 2007; Beckton et al., 2009; Garrison and Kanuka, 2004; Sharma et al., 2010; Sharpe et al., 2006) and share with wider he community (Quinsee and Bullimore, 2011) • Highlight good practices and teaching achievements as well as various teaching and learning tools and resources adopted across the university (Gramp, 2013) • Increased/sustained quality of e-learning programmes (DFES, 2003; Engelbrecht, 2003) • Improved access to learning opportunities (DFES, 2003; Engelbrecht, 2003; Ismail, 2002;) • Partner with other educational institutions and coordination across the public sector to implement the ILT strategy (Aimard, 2007; DFE, 2004; DFES, 2003; IHEP, 2000) • Establishment of an e-learning centre and development of the education workforce with

Implementation stages and high-level processes	*Processes and sub-processes*	*CSFs for e-learning implementation*
		coordination responsibilities (Aimard, 2007; DFES, 2003) • Stimulate learning and raise standards with unlimited access to learning recourses (DFE, 2004) • Provision of localised examples of attainment through e-learning (DFE, 2004) • Acknowledges staff who exploit the potential of e-learning (DFES, 2003; Gramp, 2013) • Use of ICT to build supportive, professional networks and communities of practice for developing a common vision and to support staff development (DFE, 2004) • Ensure transfer of learner data in collaborative partnerships (Beastall and Walker, 2007; DFE, 2004)

Appendix C: List of the categorised tools and technologies integrated with e-learning systems identified from the literature

Categories	*E-learning tools and technologies*
Web-based applications	• Internet or web (Bruck, 2010; Conole et al., 2006; Engelbrecht, 2003; Oliver, 2000; Stansfield et al., 2009) • Web 2.0 (Kassens-Noor, 2012; Lin et al., 2012; MacLean and Scott, 2011; Mostefaoui, 2012; Stansfield et al., 2009) • Internet gaming, graphic rich computer game and movies (Conole et al., 2006; Stansfield et al., 2009)
Web communication technology	• Email (Alhogail and Mirza, 2011; Conole et al., 2006; Khoja et al., 2002; Lin et al., 2012; Oliver, 2000; Smith, 2011; Snae et al., 2008) • Web asynchronous communication (Mascitti et al., 2007; Shachar and Neumann, 2003; Singh, 2003) • Two-way audio (Shachar and Neumann, 2003) • Online or live chat (Khoja et al., 2002; Lin et al., 2012; Snae et al., 2008; Stansfield et al., 2009; Wild et al., 2002; Blogs; Alhogail and Mirza, 2011; Conole et al., 2006; Kassens-Noor, 2012; Lin et al., 2012; Snae et al., 2008; Stansfield et al., 2009
Collaborative web technology	• Wikis (Alhogail and Mirza, 2011; Conole et al., 2006; Kassens-Noor, 2012; Lin et al., 2012; Snae et al., 2008; Stansfield et al., 2009) • Access grid technologies (Smith, 2011) • Screen capture software (Line et al., 2012) • Polls, electronic voting system and learner response systems (Alhogail and Mirza, 2011; Lewin et al., 2011; Snae et al., 2008) • Whiteboard and discussion boards (Alhogail and Mirza, 2011; Singh, 2003; Smith, 2011; Welsh et al., 2003)
Interactive tools	• Two-way interactive video (Shachar and Neumann, 2003) • Natural interaction application (Bruck, 2010) • Interactive TV, PDA (Stansfield et al., 2009) • Interactive tools such as e-book, e-libraries interactive glass floor interactive video wall or whiteboards, interactive virtual reality theatre (Bruck, 2010; Conole et al., 2006; Engelbrecht, 2003; Ghaleb et al., 2006; Govindasamy, 2002; Lewin et al., 2011; Lin et al., 2012; Shachar and Neumann, 2003; Snae et al., 2008; Welsh et al., 2003; Wentling et al., 2000 • Interactive 3D learning objects (Bruck, 2010)
Digital media and storage technologies	• Digital technology for images, video, audio (Bruck, 2010; Engelbrecht, 2003; Khoja et al., 2002; Lin et al., 2012; Mascitti et al., 2007; Mascitti et al., 2007; Mostefaoui, 2012; Welsh et al., 2003) • Digital playground (Bruck, 2010) • Digital drop box (Oliver, 2000)

Categories	*E-learning tools and technologies*
Multimedia tools	• Creative multimedia component (Bruck, 2010; Hung, 2012; Mostefaoui, 2012; Welsh et al., 2003; Wild et al., 2002) • Streaming media technology for audio and video (Oliver, 2000; Snae et al., 2008) • Video editing software (Line et al., 2012) • Podcasting such as podcast-mp3, YouTube (Bruck, 2010; Conole et al., 2006; Kassens-Noor, 2012; Stansfield et al., 2009; Wang and Shen, 2012) • Animation software such as flash, Camtasia (Lin et al., 2012; Oliver, 2000; Welsh et al., 2003)
Social networking tools	• Social networking platforms such as Skype, MSN Chat, Microsoft Netmeeting, Facebook and Twitter (Conole et al., 2006; Kassens-Noor, 2012; Lewin et al., 2011; Lin et al., 2012; MacLean and Scott, 2011; Mostefaoui, 2012; Smith, 2011; Wang and Shen, 2012)
Teaching and assessment tools	• Online or offline internet web-based instruction (Shachar and Neumann, 2003) • Graphic organiser tools (Lin et al., 2012) • Authoring tool (Alhogail and Mirza, 2011) • E-assessment (Alhogail and Mirza, 2011; Gramp, 2013) • Electronic assignment submission (Alhogail and Mirza, 2011; Gramp, 2013) Automatic interpretation of facial expressions (Snae et al., 2008) • E-portfolio of learning (Conole et al., 2006; Snae et al., 2008) • Electronic performance support systems (EPSS) (Singh, 2003)
E-learning platforms	• VLE and online learning management system (Smith, 2011) • Moodle (Lin et al., 2012) • Blackboard (Hung, 2012) • Atutor, Ilias, Sakai and Kewl (Ssekakubo et al., 2011) • Sharepoint, Desire2Learn, FirstClass (Walker et al., 2012) • Future-Learn, Instructure Canvas, Coursera, Pearson Ecollege (Walker et al., 2014) • Intelligent tutoring system (Welsh et al., 2003) • Open source technology (Mostefaoui, 2012; Stansfield et al., 2009)
Mobile learning technology	• Mobile learning technologies: • Smartphones (Bruck, 2010; Conole et al., 2006; Lewin et al., 2011; Lin et al., 2012; MacLean and Scott, 2011; Mostefaoui, 2012; Snae et al., 2008; Stansfield et al., 2009; Wang and Shen, 2012) • 3G FemtoCell (Wang and Shen, 2012) • Wireless application protocol (WAP) (Wang and Shen, 2012) • 3G networks for online devices (Wang and Shen, 2012) • Handheld devices and multi-touch surfaces including tablet PCs, laptops, netbooks, iPods, and USB cameras (Bruck, 2010; Conole et al., 2006; Lewin et al., 2011; Mostefaoui, 2012.; Stansfield et al., 2009; Wang and Shen, 2012) • GPS locator and Sketchmap software (Wang and Shen, 2012)

Categories	*E-learning tools and technologies*
Office tools and hardware technologies	• Word processors and PowerPoint software (Conole et al., 2006; Lin et al., 2012; Line et al., 2012) • Movie maker (Oliver, 2000) • Picture inversion, overlays, and framing (Mostefaoui, 2012) • Augmented reality (Lewin et al., 2011) • High realistic and low-fidelity simulators (Bruck, 2010; MacLean and Scott, 2011; Oliver, 2000; Snae et al., 2008; Welsh et al., 2003) • Liquid crystal display projector and screen (Lin et al., 2012) • Powercam software (Lin et al., 2012) • Notebooks and notepads (Lewin et al., 2011; Oliver, 2000) • Portable personal computer (Shachar and Neumann, 2003) • Compact discs (CDs) (Shachar and Neumann, 2003)

Appendix D: List of the categorised teaching and learning methods integrated with e-learning systems identified from the literature

Categories	*E-learning methods*
Interactive learning	• Discussion groups (Khoja et al., 2002; McPherson and Nunes, 2008; Oliver, 2000; Singh, 2003; Welsh et al., 2003) • Rich media presentation (Lin et al., 2012) • Learner content interaction (Smith, 2011) • Aural, tactile, and visual stimulation and interaction (Bruck, 2010) • Interactive, personalized, and distributed learning method (Bruck et al., 2010; Mascitti et al., 2007; McPherson and Nunes, 2008) • Synchronous online audio/video conferencing and training (Collis and Moonen, 2001; Lin et al., 2012; Shachar and Neumann, 2003; Singh, 2003; Welsh et al., 2003) • Use of simulations (Bruck, 2010; Singh, 2003) • Use of virtual reality based interactive 3D learning objects (I3DLO's) (Bruck, 2010) • Games-based learning (Lewin et al., 2011; MacLean and Scott, 2011; Smith, 2011; Snae et al., 2008) • Lecture capture (Gramp, 2013)
Collaborative learning	• Online classrooms (Shachar and Neumann, 2003; Singh, 2003) • Collaborative learning activities (Lewin et al., 2011; Smith, 2011; McPherson and Nunes, 2008) • Participatory learning (MacLean and Scott, 2011) • Web seminars and broadcasts coaching (Singh, 2003) • Video communications including chat, videoconferencing, personal web conferencing, electronic focus groups (Bruck, 2010; Collis and Moonen, 2001; Khoja et al., 2002; Mascitti et al., 2007; Oliver, 2000; Singh, 2003;Smith, 2011; Welsh et al., 2003; Wild et al., 2002)
Self-based learning	• Note taking and annotations (Oliver, 2000) • Asynchronous self-paced study (Singh, 2003) • Online tutoring such as distance virtual classroom (Bruck, 2010; Mascitti et al., 2007; Singh, 2003) • Use of bookmarking (Bruck, 2010; Oliver, 2000) • On-demand learning (Bruck, 2010; MacLean and Scott, 2011) • Distributed and mobile learning (Singh, 2003) • Entertaining video clip (Bruck, 2010) • Personal RSS feed (Bruck, 2010)
E-assessment	• Online test and questions (Bruck, 2010) • Creating computer-aided and web-based instructions (Lin et al., 2012; Shachar and Neumann, 2003;) • Constructing a computerized test (Lin et al., 2012)

Creative learning	• Use of online encyclopaedia and thesaurus (Bruck, 2010) • Use animated cartoons (Mascitti et al., 2007) • Use hyper textual learning (Mascitti et al., 2007) • Apply modularity contents (Mascitti et al., 2007) • Applying andragogy principles (Bruck, 2010) • Educational film and games or gamification (Bruck, 2010)

Appendix E: List of the stages and processes identified from the case studies

Stages	*Processes identified from the case study*
Stage.1. Review and Analysis	Process AR.1 identify and involve related stakeholders Process AR.2 define purpose and scope • AR.1.1 set-up sig and wg • AR.1.2 define specifications and requirements Process AR.3 define and prioritise the requirements Process AR.4 analysis and evaluation of potential solutions • AR.3.1 analysis pedagogical choices • AR.3.2 vendor analysis • AR.3.3 in-house solution analysis Process AR.5 institutional analysis • AR.4.1 assess benefits • AR.4.2 assess change implications Process a.6 end-user analysis • AR.6.1 analyse difficulties and limitations for students • AR.6.2 analyse lecturers' needs and technology awareness Process AR.7 sector analysis Process AR. 8 develop business case Process AR.9 decision making
Stage.2. Planning and Preparation	Process PP.1 identify and involve related stakeholders Process PP.2 gather viewpoint of stakeholders Process PP.3 assign roles • PP3.1 assign project manager • PP3.2 assign project teams Process PP.4 identify a clear set of objectives Process PP.5 consult with external supporting body Process PP.6 prepare schedule and project initiation documents Process PP.7 set a time line Process PP.8 arrangement and announcement
Stage 3. Design	Process d.1 course design and content development • D.1.1 establish learning and teaching solutions unit • D.1.2 plan for course structure • D.1.3 authoring course contents • D.1.4 review and edit content • D.1.5 deliver presentation Process D.2 interface design Process D.3 system design for in-house product only Process D.4 design iteration
Stage 4. VLE Development and Deployment	Process DD.4.1 arrange-hire development team for in-house product Process DD.4.1 outsource for external vendor product Process DD.4.2 actual build of the software Process DD.4.2 customise vendor product Process DD.4.3 iterative prototype and testing Process DD.4.4 VLE hosting

Stages	*Processes identified from the case study*
Stage 5. Formative Evaluation	Process FE.1 run pilot study Process FE.2 capture end-user feedback
Stage 6. Review and Bug Fixing	Process RBF.1 identify and prioritise issues from stage 5 Process RBF.2 resolve reported issues
Stage 7. Integration	Process I.1 integrate with tools and technologies Process I.2 integrate with other systems
Stage 8. Migration	Process M.1 migration from one system to another • M.1.1 conduct migration • M.2.1 identify issues of migration Process M.2 migration of modules and course materials
Stage 9. Staff training	Process T.1 organise staff training Process T.2 assign trainers Process T.3 assign teaching administrator for each school/ department Process T.4 conduct training sessions Process T.5 provide different supporting resources
Stage 10. Final release and Go Live	Process GL.1 prepare for go live Process GL.2 allocate risk period Process GL.3 communicate and inform all the stakeholders (e.g. schools in the uni) Process GL.4 launch the VLE
Stage 11. Continual Training and Support	Process CTS.1 organise continuous training sessions Process CTS.2 promote applying technology in a pedagogical practices Process CTS.3 evaluate the effectiveness of the training provided Process CTS.4 establish champion network
Stage 12. Continual Evaluation	Process E.1 quality assurance process Process E.2 conduct evaluation of the system Process E.3 make recommendations for improvement Process E.4 develop centre of excellence

Appendix F: List of the stakeholders (SHs) identified from the case studies

Nos.	*Stakeholders involved in VLE implementation*
SH-1	Student
SH-2	Academic staff
SH-3	Support services, e.g. computer and student centres
SH-4	Non-academic researcher having experience of using VLE
SH-5	Administration, admin staff
SH-6	Student union
SH-7	It department
SH-8	VLE technical team
SH-9	Learning developing centre who deliver some e-learning courses
SH-10	Library and library users
SH-11	Staff involved in teaching, learning or assessment
SH-12	Organizational strategy and policy-makers
SH-13	Top management, senior management, all the management members
SH-14	Departments and schools
SH-15	Head of department and head of school
SH-16	Support staff on the schools
SH-17	Technology supporting team
SH-18	Learning teaching team
SH-19	E-learning environment team and strategy committee
SH-20	External training provider
SH-21	Project board, pedagogical board
other stakeholders	Teaching committees, academic committee, experts in teaching, steering group, faculty quality enhancement group, strategy unit, e-learning facilitator, e-learning champion network, VLE strategy working group, learning enhancement coordinators, learning technologist, assessment people, vice province of the education, strategic education committee, ICT staff

Appendix G: List of the critical success factors (CSFs) identified from the case studies

Nos.	*Critical success factors (CSFs) for VLE implementation*
CSF-1	Top management support
CSF-2	Involve the stockholders in different stages of VLE implementation
CSF-3	Communication between different stakeholders
CSF-4	Enhance user experience
CSF-5	Functionality and accessibility of the system
CSF-6	Ease of use and user friendliness
CSF-7	Provide training and support
CSF-8	Prepare staff and student for the change
CSF-9	Provide different supporting resources
CSF-10	Identify stakeholders and their needs
CSF-11	Accuracy of information
CSF-12	Consider student learning opportunities
CSF-13	Ensure the requirements are correctly captured and ranked
CSF-14	Involve staff and students (e.g. gathering requirements, pilot study)
CSF-15	Conduct focus groups for staff and student
CSF-16	Gathering and consider functional and non-functional requirements
CSF-17	Consider survey on skills and needs across all the staff
CSF-18	Evaluate potential solutions against the requirements
CSF-19	Demonstration of other VLE systems
CSF-20	Consider different communities to review VLE
CSF-21	Involve representative from each faculty
CSF-22	Consider system that supports the institution needs
CSF-23	Consider change management
CSF-24	Best practice are identify
CSF-25	Capable infrastructure
CSF-26	Cost benefit analysis
CSF-27	Consider duration and timescales
CSF-28	Conduct risks analysis
CSF-29	Financial consideration
CSF-30	Top management involvement
CSF-31	In line with the TEL strategy
CSF-32	Meet the university's current and future requirements
CSF-33	Consider open source vs. commercial product
CSF-34	Consider staff's technology awareness
CSF-35	Ability to customize and modify the environment
CSF-36	Meet student expectation of the new VLE
CSF-37	Create awareness about VLE across the HEI
CSF-38	Availability of technical support
CSF-39	Ensure well-structured process
CSF-40	Facilitate joint online teaching with other HEIs
CSF-41	Clear plan and good project management
CSF-42	Clear purpose and scope

Nos.	*Critical success factors (CSFs) for VLE implementation*
CSF-43	Consider mitigation time
CSF-44	Adopt a training model
CSF-45	Consider immediate respond to the user needs
CSF-46	Incorporate user engagement strategy (tel.7)
CSF-47	Availability of induction for new staff and student
CSF-48	Support different learning style and meet learning needs
CSF-49	Offer staff development courses
CSF-50	Provide continual training and support for staff and student
CSF-51	Sustainable training programme
CSF-52	Apply technology in pedagogical practices (tel.5)
CSF-53	Enable academic staff to offer active and creative ways of learning (tel.5)
CSF-54	Pedagogy first then find the suitable technology (tel.5-r.5)
CSF-55	Consider new trends and innovative technologies within the pedagogical practices (tel.5-r.1)
CSF-56	Consistently capture end-user feedback
CSF-57	In line with quality enhancement group (tel.3-r.4)
CSF-58	Engage all staff in training
CSF-59	Consider a model or framework
CSF-60	Up-take
CSF-61	It should be big improvement
CSF-62	Provide technical support
CSF-63	Consider adoption of an engagement model
CSF-64	Consider cultural change (tel t.8) and innovation (tel.9)
CSF-65	Effective market research
CSF-66	Manage diversity effectively
CSF-67	Look into the right community
CSF-68	Maintain risk register
CSF-69	Allocation of adequate risk period
CSF-70	Provision of support from learning technology team
CSF-71	Adapt cordial course model
CSF-72	Consider student induction design
CSF-73	Involve experts in course design
CSF-74	Design courses to fit end-user needs
CSF-75	Consider user-centred design by allowing learners to make choices
CSF-76	Obtain accreditation and recognition for courses
CSF-77	Gather student feedback for interface design
CSF-78	Ability to integrate with other systems, technologies and tools
CSF-79	Consider legislation
CSF-80	Ensure regular update and continual improvement of the system
CSF-81	Consider setting pilot groups and train pilot users
CSF-82	Report outcomes or results of the pilot study
CSF-83	Set-up a testing course
CSF-84	Consider end-user satisfaction and usability
CSF-85	Consider multi-method approach to capture user feedback
CSF-86	Consider integration with other system in the university
CSF-87	Steady integration

Nos.	*Critical success factors (CSFs) for VLE implementation*
CSF-88	Consider steady and parallel migration
CSF-89	Availability of training material
CSF-90	Conduct training need analysis for each department
CSF-91	Consider direct and continuous support from the technical team
CSF-92	Conduct different levels and types of training
CSF-93	Consider the result of review and analysis (tel.1)
CSF-94	Consider external training consultant
CSF-95	Develop a strategy and vision collaboratively with faculty
CSF-96	Enhance student learning experience
CSF-97	Availability of virtual experiences
CSF-98	Enforce group work
CSF-99	Handle and use combination of all media
CSF-100	System is always available for use
CSF-101	Efficient build and update of contents online
CSF-102	Back-ups are maintained
CSF-103	Consider a standard benchmark review
CSF-104	Consider student satisfaction
CSF-105	Share experiences and good practices
CSF-106	Consider system enhancement
CSF-107	Consider and understand organisational politics
CSF-108	Consider maturity or stability of technology chosen
CSF-109	Consult with different stakeholders
CSF-110	Consider alternatives of VLE system
CSF-111	Cost-effective and sustainable VLE system
CSF-112	Regular interactions with external VLE community and vendors
CSF-113	Participate in community of developer at institutional level
CSF-114	Constructive approach
CSF-115	Interesting material or motivational content
CSF-116	Consider group of academic to review the content
CSF-117	Chose the right people
CSF-118	Rigorous internal assessment
CSF-119	Consider special interests for each school or department for training
CSF-120	Availability of VLE system to staff before the start of the academic year
CSF-121	Involvement of VLE administrators before go live
CSF-122	Consider scalability
CSF-123	Availability of communication support
CSF-124	Adopt continuing professional development course (CPD)
CSF-125	Get user feedback on the training provided
CSF-126	Acknowledge staff online working hours
CSF-127	Acknowledge staff who exploit the potential of e-learning
CSF-128	Make change according to feedback
CSF-129	Ensure sustainability
CSF-130	Clear quality standards
CSF-131	Gauge success from organisational, technological, pedagogical, user and financial perspectives
CSF-132	Continual or regular evaluations

Nos.	*Critical success factors (CSFs) for VLE implementation*
CSF-133	Faculty based need evaluation
CSF-134	Move towards excellence
CSF-135	VLE system is securely hosted, backed-up, and maintained
CSF-136	Maintenance agreements
CSF-137	Adequate and reliable
CSF-138	Consider approval from quality management team
CSF-139	Foster awareness of the overall strategic aim internally
CSF-140	VLE champion with clear vision and strong leadership
CSF-141	Develop centre of excellence

Appendix H: List of the challenges (CLGs) identified from the case studies

NOS.	*Challenges faced*
CLG-1	Lack of usability
CLG-2	Resistance from staff to change
CLG-3	Poor user experience
CLG-4	Lack of engagement
CLG-5	Awareness of the product and how to use it correctly
CLG-6	Accessibility issues
CLG-7	Decision to choose a VLE that fulfils the university's needs
CLG-8	Financially constrained
CLG-9	Priorities what the most important things (most have) in gathering the requirements
CLG-10	User likeness or acceptance
CLG-11	Cope with what the sector is facing at the moment
CLG-12	Get the right people to make the decision
CLG-13	Get information from stakeholder
CLG-14	Migrating the data from one system to another
CLG-15	Overlap between the old and new system
CLG-16	Major issues occur in first year after go live
CLG-17	Lack of additional support
CLG-18	If provider technical support is not local
CLG-19	Lack of cooperation from other stakeholder
CLG-20	Technical issues
CLG-21	Different subjects have different e-learning needs
CLG-22	Technology limitation
CLG-23	Consider intellectual property rights
CLG-24	Course suitable for multi-cultural diversity
CLG-25	Lack of adaptability and customization in commercial systems
CLG-26	Big selling in VLE (it is the bit that matters) in-house development and deployment
CLG-27	Higher risk of in-house development and deployment
CLG-28	Lack of resources in-house development and deployment
CLG-29	Variation in practices across different programs
CLG-30	Demonstrate positive change
CLG-31	Report and resolve bug if the provider is not local (commercial product)
CLG-32	Time in hosting
CLG-33	Choose suitable pilot users
CLG-34	Complexity when integrated with other systems
CLG-35	Data migration in integration systems
CLG-36	Getting user experience right

NOS.	*Challenges faced*
CLG-37	Conducting formative evaluation
CLG-38	Different user needs
CLG-39	Get people to attend training sessions
CLG-40	Time to launch the VLE
CLG-41	Sustainability
CLG-42	Consistency
CLG-43	Keep up to date where policy changed
CLG-44	Require learning new things
CLG-45	Writing the material in different way
CLG-46	Dedicated infrastructure
CLG-47	Lecturer time
CLG-48	Funded body
CLG-49	Evaluating existing VLEs' implementation experiences
CLG-50	Identifying the right people
CLG-51	Defining pedagogical and financial plans
CLG-52	Spread awareness
CLG-53	System incompatibility

Appendix I: Requirements for technology enhanced learning (TEL) strategy

SR. NO.	*Tel requirements*
TEL.1-R.1	Having a clear strategy, goal, objective
TEL.1-R.2	Involving suitable and qualified people
TEL.2-R.1	Align TEL strategy to the learning overall model
TEL.2-R.2	Consider end-user needs
TEL.3-R.1	Involve faculty learning technologist
TEL.3-R.2	Involve VLE review steering group
TEL.3-R.3	TEL forum
TEL.3-R.4	Involve faculty quality enhancement group
TEL.4-R.1	Raise it skills level
TEL.4-R. 2	Awareness with the existing technology for all staff and students
TEL.4-R.3	Change the misuse of VLE
TEL.4-R.4	Demonstrate different possibilities of using VLE to stretch the academics' use
TEL.4-R.5	Encourage online learning activity design
TEL.4-R.6	Foster academics understanding of how to use technologies and why
TEL.4-R.7	Provide TEL support courses
TEL.4-R.8	External body support
TEL.5-R.1	Innovative uses of technology in pedagogical practices
TEL.5-R.2	Consider assessment criteria
TEL.5-R.3	Get quick support
TEL.5-R.4	Lecturer willingness to use the system
TEL.5-R.5	Pedagogy first then find the suitable technology
TEL.5-R.6	Share different types of learning resources with students effectively
TEL.5-R.7	Efficient system
TEL.5-R.8	Encourage more interactivity
TEL.5-R.9	Smart intervention of digital technologies in the pedagogy
TEL.5-R.11	Use various teaching method
TEL.5-R.12	Highlight teaching achievements and share good practices
TEL.6 R.1	Enhance student learning experience
TEL.6 R.2	Support different learning style and meet learning needs
TEL.6 R.3	Flexible way of learning
TEL.6 R.4	Enable students to achieve optimum learning experiences
TEL.6 R.5	Empower student with skills needed by employers
TEL.6 R.6	Staff and student support Engagement with technology Willingness to change Optimism Open-mindedness Responsible risk-taking, and Student interactions with each other
TEL.7-R.1	Engage student with e-learning technologies
TEL.7-R.2	Impose introductory obliges policies
TEL.7-R.3	Lecturer drive and encourage online activities
TEL.7-R.4	Adopt of engagement model
TEL.7-R.5	Intervention technology in student scheme of work

SR. NO.	*Tel requirements*
TEL.7-R.6	Adequate training
TEL.7-R.7	Working with learning enhancement coordinator
TEL.8-R.1	Encourage use of technology in day to day activities of staff (e.g. paperless meetings)
TEL.8-R.2	Changing in behaviour so people to be willing to innovate more with the system
TEL.8-R.3	Manage resistance
TEL.8-R.4	Online marking and feedback (e-assessment)
TEL.8-R.5	Ensure institution regulations are fit for purpose
TEL.8-R.6	Recognising and rewarding good teaching
TEL.8-R.7	Career paths enabling staff to progress to senior positions via a teaching (as opposed to research) route
TEL.9-R.1	Support innovative unite
TEL.9-R.2	Innovation in research and knowledge exchange
TEL.9-R.3	Innovation in the design of the new curricula
TEL.9-R.4	Educational research units
TEL.10-R.1	Representatives from each department
TEL.10-R.2	Representatives are one academic and one either teaching administrator or technical person
TEL.10-R.3	Multiple communication channels
TEL.10-R.4	Senior management buy-in
TEL.10-R.5	Direct related to e-learning support team
TEL.10-R.6	Consider the outcome reports to make changes accordingly
TEL.10-R.7	Involve e-learning champions in decision making
TEL.10-R.8	Exchange experiences to identify good practices
TEL.11-R.1	Join external community of user
TEL.11-R.2	Participate in e-learning national groups
TEL.11-R.3	Facilitated join online teaching with other institutions
TEL.11-R.4	Exchange knowledge and experiences with other institution

Appendix J: Refined comprehensive mapping of VLE system implementation stages with corresponding processes and critical success factors (CSFs)

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
App.J.1	Stage-1	Overarching CSFs		Stg-1.AR.CSF.1	Consider a standard benchmark review
				Stg-1.AR.CSF.2	Commitment and active support from senior management
				Stg-1.AR.CSF.3	Availability of virtual experiences or success stories
				Stg-1.AR.CSF.4	Best practices are identified
		Ar.1	General	Stg-1.PR AR.1.CSF.1	Clear purpose and scope
				Stg-1.PR AR.1.CSF.2	Consider enhancing student experience and learning opportunities
				Stg-1.PR AR.1.CSF.3	Focus on quality enhancement of the institution
				Stg-1.PR AR.1.CSF.4	Identify and consider stakeholder needs
			AR.1.1	Stg-1.SUB-PR-AR.1.1.CSF.1	Consult with different stakeholders
				Stg-1.SUB-PR-AR.1.1.CSF.2	Ensure that everyone is clear about the process
			AR.1.2	Stg-1.SUB-PR-AR.1.2.CSF.1	Hold a series of workshops, focus groups, surveys and consultations with related stakeholder
				Stg-1.SUB-PR-AR.1.2.CSF.2	Establish technology enhance learning centre (tel.3)
				Stg-1.SUB-PR-AR.1.2.CSF.3	In-line with the vision of the institution
		Ar.2	General	Stg-1.PR-AR.2.CSF.1	Institutional analysis is in-line or supports the vision, mission, and policy of the institution
				Stg-1.PR-AR.2.CSF.2	Consider system that support the institution’s needs
			AR.2.1	Stg-1.Sub-PR-AR.2.1.CSF.1	Assess the actual benefits of implementing VLE
			AR.2.2	Stg-1.Sub-PR-AR.2.2.CSF.1	Consider organizational, cultural, and employee attitude
				Stg-1.Sub-PR-AR.2.2.CSF.2	Preparing staff and student for the change
				Stg-1.Sub-PR-AR.2.2.CSF.3	Consider change management
				Stg-1.Sub-PR-AR.2.2.CSF.4	Proactive management approach
				Stg-1.Sub-PR-AR.2.2.CSF.5	Consider time suitability for VLE change

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
			AR.2.3	Stg-1.Sub-PR-AR.2.3.CSF.1	Capable infrastructure
				Stg-1.Sub-PR-AR.2.3.CSF.2	Consider equipment: hardware and software
				Stg-1.Sub-PR-AR.2.3.CSF.3	Consider adequate provision of resources including appropriate IT support and help systems
				Stg-1.Sub-PR-AR.2.3.CSF.4	Availability of information about the overall model of learning and learning support requirement
		AR.3	General	Stg-1.PR-AR.3.CSF.1	Investigate into good practices across other universities
				Stg-1.PR-AR.3.CSF.2	Consider the product repetition
				Stg-1.PR-AR.3.CSF.3	Look into the right community
		AR.4	General	Stg-1.PR-AR.4-CSF.1	Consider all end-user communities to review the VLE
				Stg-1.PR-AR.4-CSF.2	Effectively manage diversity
				Stg-1.PR-AR.4-CSF.3	Consider affordability
				Stg-1.PR-AR.4.1.CSF.4	Test and evaluate user needs or requirements
		AR.5	General	Stg-1.PR- AR.5.CSF.1	Communication with all related stakeholders
				Stg-1.PR- AR.5.CSF.2	Make sure the requirements are right
			AR.5.1	Stg-1.SUB-PR-AR.5.1 CSF.1	Conduct focus groups with student and academic staff
				Stg-1.SUB-PR-AR.5.1 CSF.2	Clear technology requirements
				Stg-1.SUB-PR-AR.5.1 CSF.3	Gather functional and non-functional requirements
				Stg-1.SUB-PR-AR.5.1 CSF.4	Involve representative from each faculty
			AR.5.2	Stg-1.SUB-PR-AR.5.2.CSF.1	Adequate ranking of the requirements
		AR.6	General	Stg-1.PR-AR.6.CSF.1	Evaluate the potential solutions against the requirements
				Stg-1.PR-AR.6.CSF.2	Community of developers and a community of users as part of the institutions to review
			AR.6.1	Stg-1.SUB-PR-AR.6.1.CSF.1	Consider functional and non-functional requirements defined in process ar.5
				Stg-1.SUB-PR-AR.6.1.CSF.2	Review existing VLEs
			AR.6.2	Stg-1.SUB-PR- AR.6.2.CSF.1	Consider skills on sight to do the development work
		AR.7	General	Stg-1.PR-AR.7.CSF.1	Conduct cost benefit analysis

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
				Stg-1.PR-AR.7.CSF.2	Define the duration and timescales
				Stg-1.PR-AR.7.CSF.3	Adequate provision of resources
				Stg-1.PR-AR.7.CSF.4	Appropriate risk assessment
				Stg-1.PR-AR.7.CSF.5	Consider the key elements including effective and transparent business model; tangible and intangible benefits; direct and indirect costs/ effective and realistic business model
			AR.7.1	Stg-1.Sub-PR- AR.7.1.CSF.1	Consider sustainability
				Stg-1.Sub-PR- AR.7.1.CSF.2	Effective market research
				Stg-1.Sub-PR- AR.7.1.CSF.3	Market the distance learning programs internally and externally
			AR.7.2	Stg-1.Sub-PR- AR.7.2.CSF.1	Accuracy of information generated
		AR.8	AR.8.1	Stg-1.Sub-PR-AR.8.1.CSF.1	Involve the stakeholders mentioned in appendix-b for process ar.8
			AR.8.3	Stg-1.Sub-PR-AR.8.3. CSF.1	Cost-effective and sustainable VLE system
				Stg-1.Sub-PR-AR.8.3.CSF.2	It should be big improvement which include improved access to learning opportunities
				Stg-1.Sub-PR-AR.8.3.CSF.3	Financial consideration
				Stg-1.Sub-PR-AR.8.3.CSF.4	Adequate funding for staff development
				Stg-1.Sub-PR-AR.8.3.CSF.5	Ability to customize the environment
				Stg-1.Sub-PR-AR.8.3.CSF.6	Ability to modify the system
				Stg-1.Sub-PR-AR.8.3.CSF.7	Availability of technical support
				Stg-1.Sub-PR-AR.8.3.CSF.8	Consider staff's technology awareness
				Stg-1.Sub-PR-AR.8.3.CSF.9	Have a clean ownership for the project
				Stg-1.Sub-PR-AR.8.3.CSF.10	Meet student expectation of the new VLE
				Stg-1.Sub-PR-AR.8.3.CSF.11	Up-take
				Stg-1.Sub-PR-AR.8.3.CSF.12	In-line with TEL strategy
				Stg-1.Sub-PR-AR.8.3.CSF.13	Consider open-source vs. commercial product (if external

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
					vendor is chosen)
				Stg-1.Sub-PR-AR.8.3.CSF.14	In-line with vision of the future of e-learning in the institution
			AR.8.4	Stg-1.Sub-PR-AR.8.4.CSF.1	Consider maturity or stability of technology chosen
				Stg-1.Sub-PR-AR.8.4.CSF.2	Invite different commercial vendor product providers
				Stg-1.Sub-PR-AR.8.4.CSF.3	Invite people from other universities used open source product
App.J.2	Stage-2	Overarching CSFs		Stg-2.PP.CSF.1	Support from top management
				Stg-2.PP.CSF.2	Ensure that the planning is well-structured
				Stg-2.PP.CSF.3	Plan for sustainability in term of availability of on-going financial support
				Stg-2.PP.CSF.4	Consider a model or framework
				Stg-2.PP.CSF.5	Communication
				Stg-2.PP.CSF.6	Enforce group work
		PP.1	General	Stg-2.PR-PP.1.CSF.1	Consider and understand organisational politics
				Stg-2.PR-PP.1.CSF.2	In-line with the decision made in process ar.8
		PP.2	General	Stg-2.PR-PP.2.CSF.1	Top management support
				Stg-2.PR-PP.2.CSF.2	Communication in the project
				Stg-2.PR-PP.2.CSF.3	Identify and involve e-learning champions
				Stg-2.PR-PP.2.CSF.4	Involve manager or it director, faculty or teaching committees, head of school, IT department, strategy unit
				Stg-2.PR-PP.2.CSF.5	Ensure that everyone is clear about the process
		PP.3	General	Stg-2.PR-PP.3.CSF.1	Clear plan
				Stg-2.PR-PP.3.CSF.2	Consider alternatives
				Stg-2.PR-PP.3.CSF.3	Flexibility in the plan
				Stg-2.PR-PP.3.CSF.4	Follow project steps
				Stg-2.PR-PP.3.CSF.5	Consider mitigation time
				Stg-2.PR-PP.3.CSF.6	Maintain risk register

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
				Stg-2.PR-PP.3.CSF.7	Scalability
				Stg-2.PR-PP.3.CSF.8	Set dates
				Stg-2.PR-PP.3.CSF.9	Communicating well and readjusting work accordingly
			PP.3.1	Stg-2.Sub-PR-PP.3.1.CSF.1	Champion with clear vision and strong leadership
				Stg-2.Sub-PR-PP.3.1.CSF.2	Pro-active management
				Stg-2.Sub-PR-PP.3.1.CSF.3	Availability of sponsorship for the implementation
			PP.3.1 Project Manager	Stg-2.Sub-PR-PP.3.1.CSF.4	Qualified project management
				Stg-2.Sub-PR-PP.3.1.CSF.5	Effective partnerships with all stakeholders
				Stg-2.Sub-PR-PP.3.1.CSF.6	Obtain local field manager commitment
			PP.3.1 Technical Team	Stg-2.Sub-PR-PP.3.1.CSF.7	Capable to support
				Stg-2.Sub-PR-PP.3.1.CSF.8	Get different source of support
				Stg-2.Sub-PR-PP.3.1.CSF.9	Provide technical support
				Stg-2.Sub-PR-PP.3.1.CSF.10	Consider institutional, student, and faculty support
				Stg-2.Sub-PR-PP.3.1.CSF.11	Consider provision of online advice, and guidance (in-line with stage-11)
			PP.3.1 Training Team	Stg-2.Sub-PR-PP.3.1.CSF.12	Undertake and responsible for Stages 9 and 11
				Stg-2.Sub-PR-PP.3.1.CSF.13	Carefully consider issues of training design
				Stg-2.Sub-PR-PP.3.1.CSF.14	Effective management of training as an organisation-wide initiative
				Stg-2.Sub-PR-PP.3.1.CSF.15	Conduct training activities with students and staff including staff development
			PP.3.1 Pedagogical Team	Stg-2.Sub-PR-PP.3.1.CSF.16	Apply technology in pedagogical practices (in-line with tel.5)
			PP.3.2	Stg-2.Sub-PR-PP.3.2.CSF.1	Determination of completion date for development work
		PP.4	General	Stg-2.PR-PP.4.CSF.1	Regular interactions with external VLE community and vendors
				Stg-2.PR-PP.4.CSF.2	Participate in community of developer at institution level

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
		PP.5	General	Stg-2.PR-PP.5.CSF.1	Create broad awareness of the overall strategic aim among internal stakeholders in the institution
				Stg-2.PR-PP.5.CSF.2	Support from all the internal stakeholders
App.J.3	Stage-3	D.1	General	Stg-3.PR-D.1.CSF.1	Adequate staff training is provided for course design
				Stg-3.PR-D.1.CSF.2	Well-established design template
				Stg-3.PR.D.1.CSF.3	Design courses to fit end-user needs
				Stg-3.PR-D.1.CSF.4	Continuity
				Stg-3.PR-D.1.CSF.5	Embedding technology that enables student to create content
				Stg-3.PR-D.1.CSF.6	Embedding the use of technology to serve pedagogy
				Stg-3.PR-D.1.CSF.7	Consider user-centred design by allowing learners to make choices
				Stg-3.PR-D.1.CSF.8	Involve academic staff
				Stg-3.PR-D.1.CSF.9	Meet the university requirements
				Stg-3.PR-D.1.CSF.10	Possibility to use the previous course design
				Stg-3.PR-D.1.CSF.11	Structuring the course in its totality including learning design
				Stg-3.PR-D.1.CSF.12	Support from learning technology team
				Stg-3.PR-D.1.CSF.13	Availability of variety of learning resources
				Stg-3.PR-D.1.CSF.14	Comprehensive, exciting, and stimulating online learning environments with high quality e-content
				Stg-3.PR-D.1.CSF.15	Consistent student experience
			D.1.1	Stg-3.Sub-PR-D.1.1.CSF.1	Connect with the VLE team
				Stg-3.Sub-PR.D.1.1.CSF.2	Getting it supports
				Stg-3.Sub-PR.D.1.1.CSF.3	Participate in the course module team
				Stg-3.Sub-PR.D.1.1.CSF.4	Provide advice to academic staff in course design
				Stg-3.Sub-PR.D.1.1.CSF.5	Readymade course designs for staff to use
				Stg-3.Sub-PR.D.1.1.CSF.6	Consider availability of e-learning development grants

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
			D.1.2	Stg-3.Sub-PR.D.1.2.CSF.1	Constructive approach
				Stg-3.Sub-PR.D.1.2.CSF.2	Adapt cordial course model
				Stg-3.Sub-PR.D.1.2.CSF.3	Consider student feedback for each course
				Stg-3.Sub-PR.D.1.2.CSF.4	Consider student induction design
				Stg-3.Sub-PR.D.1.2.CSF.5	Evaluate the previous courses
				Stg-3.Sub-PR.D.1.2.CSF.6	Consider collaborating with educational experts
				Stg-3.Sub-PR.D.1.2.CSF.7	Academic staff has control over creating the course design
				Stg-3.Sub-PR.D.1.2.CSF.8	Use research skills to investigate subject
				Stg-3.Sub-PR.D.1.2.CSF.9	Consider using suitable tools and technologies/ multimedia
			D.1.3	Stg-3.Sub-PR.D.1.3.CSF.1	Careful consideration of the underlying pedagogy such as pure virtual or blended learning experience
				Stg-3.Sub-PR.D.1.3.CSF.2	Consider distance education
			D.1.4	Stg-3.Sub-PR.D.1.4.CSF.1	Interesting material or motivational content
				Stg-3.Sub-PR.D.1.4.CSF.2	Resource faculty time to develop material themselves
			D1.5	Stg-3.Sub-PR.D.1.5.CSF.1	Consider group of academic to review the content
				Stg-3.Sub-PR.D.1.5.CSF.2	On-demand access to the resources
				Stg-3.Sub-PR.D.1.5.CSF.3	Consider approval from quality management team
			D1.6	Stg-3.Sub-PR.D.1.6.CSF.1	Compatible with the university policies
				Stg-3.Sub-PR.D.1.6.CSF.2	Involve presentation team
				Stg-3.Sub-PR.D.1.6.CSF.3	Ready for student before the start of the semester
		D.2	General	Stg-3.PR-D.2.CSF.1	Ability to integrate with other systems, technologies and tool
				Stg-3.PR-D.2.CSF.2	Applicable or qualified team
				Stg-3.PR-D.2.CSF.3	Consider legislation
				Stg-3.PR-D.2.CSF.4	Consider a model
				Stg-3.PR-D.2.CSF.5	Good database structure

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
				Stg-3.PR-D.2.CSF.6	Proper design guidance
				Stg-3.PR-D.2.CSF.7	Adequate and reliable storage
				Stg-3.PR-D.2.CSF.8	Secure storage
				Stg-3.PR-D.2.CSF.9	Continuous support
		D.3	General	Stg-3.PR-D.3.CSF.1	Ease of use and user friendliness
				Stg-3.PR-D.3.CSF.2	Customisable interface
				Stg-3.PR-D.3.CSF.3	User-friendly interface with communication tools for interactivity
				Stg-3.PR-D.3.CSF.4	Gather student feedback for interface design and modify accordingly
				Stg-3.PR-D.3.CSF.5	Single log-in
				Stg-3.PR-D.3.CSF.6	Personalise the web experience
		D.4	General	Stg-3.PR-D.4.CSF.1	Repeated iterative design process
				Stg-3.PR-D.4.CSF.2	Changes and refinements based on the results
App.J.4	Stage-4	Overarching CSFs		Stg-4.DD.CSF.1	Back-ups are maintained
				Stg-4.DD.CSF.2	Maintenance and accessibility issues are addressed
				Stg-4.DD.CSF.3	Can be integrated with different website
				Stg-4.DD.CSF.4	Efficient build and update of contents online
				Stg-4.DD.CSF.5	Full functionality is achieved
				Stg-4.DD.CSF.6	System is always available for use
				Stg-4.DD.CSF.7	Handle and use combination of all media
				Stg-4.DD.CSF.8	Regular system updates including enhancement of existing features
		DD.1	General In-house	Stg-4.PR-DD.1.CSF.1	Capable web developer
				Stg-4.PR-DD.1.CSF.2	Formal recognition of developer’s role
				Stg-4.PR-DD.2.CSF.2	Consider extra time for mitigation
				Stg-4.PR-DD.2.CSF.3	Consider the time available for the development
				Stg-4.PR-DD.2.CSF.4	Assure way to continual improvement

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
				Stg-4.PR-DD.2.CSF.5	Easily modifiable platform
				Stg-4.PR-DD.2.CSF.6	System security is in place
				Stg-4.PR-DD.2.CSF.7	Interpret and write technical specifications
		DD.1	General Outsource	Stg-4.PR-DD.1.CSF.1	Customised state-of-the-art installation considering standardization in quality and evaluation
				Stg-4.PR-DD.1.CSF.2	Maintain good relationship with external provider
		DD.2	General Outsource	Stg-4.PR-DD.2.CSF.1	Maintenance agreements are in place
				Stg-4.PR-DD.2.CSF.2	Customise the vendor product to suite the institution's requirements
		DD.4	General	Stg-4.PR-DD.4.CSF.1	VLE system is securely hosted, backed-up, and maintained
				Stg-4.PR-DD.4.CSF.2	Capable internal or external hosting
App.J.5	Stage-5	FE.1	General	Stg-5.PR-FE.1.CSF.1	Involve student and academic staff in the usability test of the VLE system
				Stg-5.PR-FE.1.CSF.2	Set-up a testing course
				Stg-5.PR-FE.1.CSF.3	Adequate pilot groups
				Stg-5.PR-FE.1.CSF.4	Train pilot users before using the system
				Stg-5.PR-FE.1.CSF.5	Gather feedback from staff and students from the pilot participants
				Stg-5.PR-FE.1.CSF.6	Report outcomes or results of the pilot study
				Stg-5.PR-FE.1.CSF.7	Evaluate and make changes as required
		FE.2	General	Stg-5.PR-FE.2.CSF.1	Rigorous internal assessment identifying weaknesses in provision
				Stg-5.PR-FE.2.CSF.2	Consider end-user satisfaction and usability
				Stg-5.PR-FE.2.CSF.3	Continuous evaluation
				Stg-5.PR-FE.2.CSF.4	Multi-method approach to capture user feedback
App.J.6	Stage-6	Overarching CSFs		Stg-6.RBF.CSF.1	Ability to tweak or improve the system continually

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
				Stg-6.RBF.CSF.2	Tweak the system based on the results from stage 5
		RBF.1	General	Stg-6.PR-RBF.1.CSF.1	Serious issue first
				Stg-6.PR-RBF.1.CSF.2	Move towards excellence
				Stg-6.PR-RBF.1.CSF.3	Take notes for future development
		RBF.2	General	Stg-6.PR-RBF.2.CSF.1	Ensure roll-out of the VLE system meets end-user needs
				Stg-6.PR-RBF.2.CSF.2	Resolve reported issue in pilot study before final release
				Stg-6.PR-RBF.2.CSF.3	Continually resolve issues with every upgrade
App.J.7	Stage-7	Overarching CSFs		Stg-7.I.CSF.1	Information accessibility and sharing
				Stg-7.I.CSF.2	Steady integration
		I.1	General	Stg-7.PR-I.1.CSF.1	Compatibility with other systems in the institution
		I.2	General	Stg-7.PR-I.2.CSF.1	Proper integration with easy steps and single login
App.J.8	Stage-8	M.1	General	Stg-8.PR-M.1.CSF.1	Steady and parallel migration
				Stg-8.PR-M.1.CSF.2	Making migration easy for all users
				Stg-8.PR-M.1.CSF.3	Discuss and highlight areas with potential issues before the complete rollout
		M.2	General	Stg-8.PR-M.2.CSF.1	Considering timing before the start of academic year
				Stg-8.PR-M.2.CSF.2	Establish roll-up in every module
				Stg-8.PR-M.2.CSF.3	Provide support and training to faculty to migrate their material
				Stg-8.PR-M.2.CSF.4	Managed by faculty
App.J.9	Stage-9	Overarching CSFs		Stg-9.T.CSF.1	Use of VLE for staff development
				Stg-9.T.CSF.2	Communication
				Stg-9.T.CSF.3	Consider external training consultant
				Stg-9.T.CSF.4	Engage all staff
				Stg-9.T.CSF.5	Top management support
				Stg-9.T.CSF.6	Access to it equipment for trainees
		T.1	General	Stg-9.PR-T.1.CSF.1	Consider special interests for each school or department

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
				Stg-9.PR-T.1.CSF.2	Conduct training needs analysis for each department
				Stg-9.PR-T.1.CSF.3	Availability of training material
				Stg-9.PR-T.1.CSF.4	Decide the trainees
				Stg-9.PR-T.1.CSF.5	Well-structured training programmes
		T.2	General	Stg-9.PR-T.2.CSF.1	Knowledgeable and experienced trainers
				Stg-9.PR-T.2.CSF.2	In-line with staff development unit
		T.3	General	Stg-9.PR-T.3.CSF.1	Qualified VLE administrator
				Stg-9.PR-T.3.CSF.2	Direct support from the technical team
		T.4	General	Stg-9.PR-T.4.CSF.1	Adequate and effective training addressing variety of needs using various technologies
				Stg-9.PR-T.4.CSF.2	Conduct different levels of training
				Stg-9.PR-T.4.CSF.3	Conduct different types of training
				Stg-9.PR-T.4.CSF.4	Sufficient content
				Stg-9.PR-T.4.CSF.5	Suitable timing and duration
		T.5	General	Stg-9.PR-T.5.CSF.1	Provision of resources such as guidelines, user manual, induction advice, and other documentation
				Stg-9.PR-T.5.CSF.2	Staff training actions are support by online resource centre
				Stg-9.PR-T.5.CSF.3	Provision of flexible access to staff development in VLE
				Stg-9.PR-T.5.CSF.4	Availability of peer support and online help
App.J.10	Stage-10	GL.1	General	Stg-10.PR-GL.1.CSF.1	Availability of VLE system to staff before the start of the academic year
				Stg-10.PR-GL.1.CSF.2	Involvement of VLE administrators before go live
				Stg-10.PR-GL.1.CSF.3	Plans are in place for wider adoption before full availability of system
				Stg-10.PR-GL.1.CSF.4	Allocation of adequate risk period
		GL.2	General	Stg-10.PR-GL.2.CSF.1	Involve all stakeholders
				Stg-10.PR-GL.2.CSF.2	Advertising

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
				Stg-10.PR-GL.2.CSF.3	Warn or create awareness
		GL.3	General	Stg-10.PR-GL.3.CSF.1	Everything ready to use in time for the launch
App.J.11	Stage-11	Overarching CSFs		Stg-11.CTS.CSF.1	Induction for new staff and students
				Stg-11.CTS.CSF.2	Immediate response to user needs
				Stg-11.CTS.CSF.3	Provide different types of supporting resources
				Stg-11.CTS.CSF.4	Availability of communication support
				Stg-11.CTS.CSF.5	Incorporate Stage-8 migration
				Stg-11.CTS.CSF.6	Provide awareness of existing technologies (in-line with tel.4)
				Stg-11.CTS.CSF.7	Incorporate user engagement strategy tel.7
				Stg-11.CTS.CSF.8	Enable academic staff to offer active and creative ways of learning (tel.5)
		CTS.1	General	Stg-11.PR-CTS.1.CSF.1	Provide continual training and support for staff and students
				Stg-11.PR-CTS.1.CSF.2	Sustainable training programme
				Stg-11.PR-CTS.1.CSF.3	Get external consultation in training programme
				Stg-11.PR-CTS.1.CSF.4	Adopt a training model
				Stg-11.PR-CTS.1.CSF.5	Continuing professional development course (CPD)
		CTS.2	General	Stg-11.PR-CTS.2.CSF.1	Get user feedback on the training provided
				Stg-11.PR-CTS.2.CSF.2	Measure the training impact on the performance
				Stg-11.PR-CTS.2.CSF.3	Make changes according to user feedback
		CTS.3	General	Stg-11.PR-CTS.3.CSF.1	Acknowledge staff online working hours
				Stg-11.PR-CTS.3.CSF.2	Acknowledge staff who exploit the potential of e-learning
				Stg-11.PR-CTS.3.CSF.3	Provide motivation scheme, performance indicators, institutional recognition for career development path
				Stg-11.PR-CTS.3.CSF.4	Careful design of efficient e-assessment format (tel.5-r.2)
				Stg-11.PR-CTS.3.CSF.5	Pedagogy first then find the suitable technology (tel.5-r.5)
				Stg-11.PR-CTS.3.CSF.6	Enable staff to offer more active and creative ways of

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
					learning (tel.5-r.5)
				Stg-11.PR-CTS.3.CSF.7	Provision of localised examples of attainment through e-learning
				Stg-11.PR-CTS.3.CSF.8	Use of tools with graphics and sounds
				Stg-11.PR-CTS.3.CSF.9	Consider new trends and innovative technologies within the pedagogical practices (tel.5-r.1)
				Stg-11.PR-CTS.3.CSF.10	Promote exciting and stimulating learning environments with attractive activities enabling interaction among all users
				Stg-11.PR-CTS.3.CSF.11	Promote interactive contents including e-learning applications, activities, and tools (tel.5-r.8)
				Stg-11.PR-CTS.3.CSF.12	Consistent with pedagogical approaches
				Stg-11.PR-CTS.3.CSF.13	Highlight and share experiences, good practices, and teaching achievements (tel.5-r.12)
				Stg-11.PR-CTS.3.CSF.14	Incorporate technology in staff development courses
				Stg-11.PR.CTS.3-CSF.15	Best practices are identified and disseminated
				Stg-11.PR.CTS.3-CSF.16	Increase awareness of various teaching and learning tools and resources adopted across the university (inline tel.4)
				Stg-11.PR-CTS.3.CSF.17	Incorporate tel.5
App.J.12	Stage-12	Overarching CSFs		Stg-12.E.CSF.1	Efficiency and ensure sustainability
				Stg-12.E.CSF.2	System enhancement
				Stg-12.E.CSF.3	Transformation
		E.1	General	Stg-12.PR-E.1.CSF.1	Clear quality standards
				Stg-12.PR-E.1.CSF.2	Gauge success from organisational, technological, pedagogical, user, and financial perspectives
		E.2	General	Stg-12.PR-E.2.CSF.1	Continual or regular evaluations
				Stg-12.PR-E.2.CSF.2	Each faculty conducts evaluation based on their needs
				Stg-12.PR-E.2.CSF.3	Design and test all tools used on the VLE system

Appendix ID	*Stage*	*Process*	*Sub-process*	*CSF ID.*	*CSF title*
				Stg-12.PR-E.2.CSF.4	Identify new trends and support innovation technology
				Stg-12.PR-E.2.CSF.5	Consistence captures end-user feedback (process fe.2)
				Stg-12.PR-E.2.CSF.6	Use of external, impartial evaluators providing a fresh perspective in addressing key issues and evaluating the success of VLE project
				Stg-12.PR-E.2.CSF.7	Use different evaluation methods and apply specific standards
				Stg-12.PR-E.2.CSF.8	Assess sustainability
		E.3	General	Stg-12.PR-E.3.CSF.1	Consider enhancements in terms of student learning and improved academic performance
				Stg-12.PR-E.3.CSF.2	In-line with quality enhancement group (tel.3-r.4)
				Stg-12.PR-E.3.CSF.3	Consider feedback from staff, students and other stakeholders
		E.4	General	Stg-12.PR-E.4.CSF.1	Accreditation and recognition for courses is obtained through partnerships with respected professional, academic organisations, and societies
				Stg-12.PR-E.4.CSF.2	Best practices are identified and disseminated
				Stg-12.PR-E.4.CSF.3	Highlight good practices and teaching achievements as well as various teaching and learning tools and resources adopted across the university
				Stg-12.PR-E.4.CSF.4	Increased and sustained quality of e-learning programmes

Appendix K: Refined mapping of stakeholders (SHs) to VLE system implementation stages

Appendix ID	*Stage*	*SH ID.*	*Sh title*
App.K.1	Stage-1	Stg-1.SH.1	Organizational strategy and policy-makers
		Stg-1.SH.2	Top management
		Stg-1.SH.3	Director
		Stg-1.SH.4	E-learning experts
		Stg-1.SH.5	Consultant/ advisor
		Stg-1.SH.6	VLE technical team
		Stg-1.SH.7	VLE pedagogical team
		Stg-1.SH.8	Academic staff
		Stg-1.SH.9	Learner
		Stg-1.SH.10	It department and support in the institution
		Stg-1.SH.11	Representative from each faculty or teaching committee
		Stg-1.SH.12	Decision maker
		Stg-1.SH.13	Process ar.8 involve top management, academic development unit, academic staff, e-learning specialists and strategic unite
App.K.2	Stage-2	Stg-2.SH.1	Director
		Stg-2.SH.2	Project manager/leader of VLE implementation project
		Stg-2.SH.3	E-leaning experts
		Stg-2.SH.4	Faculty or teaching committees
		Stg-2.SH.5	VLE technical team
		Stg-2.SH.6	VLE training team
		Stg-2.SH.7	VLE pedagogical team
		Stg-2.SH.8	Business managers/ business developer
		Stg-2.SH.9	Organizational strategy and policy-makers
		Stg-2.SH.10	Top management
		Stg-2.SH.11	Head of the schools
		Stg-2.SH.12	Academic staff
		Stg-2.SH.13	It department in the institution
		Stg-2.SH.14	Library
		Stg-2.SH.15	Computer services
App.K.3	Stage-3	Stg-3.sh.1	Project manager/leader of VLE implementation project
		Stg-3.SH.2	Design team
		Stg-3.SH.3	Research and design coordinator
		Stg-3.SH.4	E-learning experts
		Stg-3.SH.5	VLE technical team
		Stg-3.SH.6	Instructional designers
		Stg-3.SH.7	Content/ subject matter experts
		Stg-3.SH.8	Copyright coordinators
		Stg-3.SH.9	Academic staff
		Stg-3.SH.10	VLE pedagogical team
App.K.4	Stage-4	Stg-4.SH.1	Project manager/leader of VLE implementation project

Appendix ID	*Stage*	*SH ID.*	*Sh title*
		Stg-4.SH.2	Production coordinator
		Stg-4.SH.3	Development team
		Stg-4.SH.4	Quality assurance person
		Stg-4.SH.5	VLE technical team
		Stg-4.SH.6	Subject matter specialists
		Stg-4.SH.7	VLE pedagogical team
		Stg-4.SH.8	Academic staff
App.K.5	Stage-5	Stg-5.SH.1	Project manager/leader of VLE implementation project
		Stg-5.SH.2	Evaluation specialist
		Stg-5.SH.3	Design and development teams
		Stg-5.SH.4	VLE technical team
		Stg-5.SH.5	Pilot subjects
		Stg-5.SH.6	Academic staff
		Stg-5.SH.7	Learner
		Stg-5.SH.8	Head of schools/ department
App.K.6	Stage-6	Stg-6.SH.1	Project manager/leader of VLE implementation project
		Stg-6.SH.2	Design and development teams
		Stg-6.SH.3	VLE technical team
App.K.7	Stage-7	Stg-7.SH.1	Project manager/leader of VLE implementation project
		Stg-7.SH.2	Design and development teams
		Stg-7.SH.3	VLE technical team
		Stg-7.SH.4	Integrator
App.K.8	Stage-8	Stg-8.SH.1	Project manager/leader of VLE implementation project
		Stg-8.SH.2	Design and development teams
		Stg-8.SH.3	VLE technical team
		Stg-8.SH.4	Academic staff
App.K.9	Stage-9	Stg-9.SH.1	Project manager/leader of VLE implementation project
		Stg-9.SH.2	Top management
		Stg-9.SH.3	VLE technical team
		Stg-9.SH.4	VLE training team
		Stg-9.SH.5	VLE pedagogical team
		Stg-9.SH.6	Consultant/advisor (e.g. external training provider)
		Stg-9.SH.7	Staff development unit
		Stg-9.SH.8	E-learning experts
		Stg-9.SH.9	Academic staff
App.K.10	Stage-10	Stg-10.SH.1	Project manager/leader of VLE implementation project
		Stg-10.SH.2	Top management
		Stg-10.SH.3	VLE technical team
		Stg-10.SH.4	It department and support in the institution
		Stg-10.SH.5	System administrator
		Stg-10.SH.6	Academic staff
		Stg-10.SH.7	Student services/ student support

Appendix ID	*Stage*	*SH ID.*	*Sh title*
App.K.11	Stage-11	Stg-11.SH.1	Top management
		Stg-11.SH.2	VLE technical team
		Stg-11.SH.3	It department and support in the institution
		Stg-11.SH.4	Staff development unit
		Stg-11.SH.5	VLE training team
		Stg-11.SH.6	VLE pedagogical team
		Stg-11.SH.7	Researchers and students
		Stg-11.SH.8	Student services/ student support
		Stg-11.SH.9	Academic staff
App.K.12	Stage-12	Stg-12.SH.1	Evaluation specialist
		Stg-12.SH.2	Top management
		Stg-12.SH.3	External body for performance improvement
		Stg-12.SH.4	E-learning champions
		Stg-12.SH.5	Academic staff
		Stg-12.SH.6	Consultant/ advisor
		Stg-12.SH.7	Quality assurance

Appendix L: Refined mapping of challenges (CLGs) to VLE system implementation stages

Appendix ID	*Stage*	*CLG ID.*	*Clg title*
App.L.1	Stage-1	Stg-1.CLG.1	Decision to choose a VLE that fulfils the university's needs
		Stg-1.CLG.2	Choose the right people to make the decision
		Stg-1.CLG.3	Financially constrained
		Stg-1.CLG.4	Defining students' needs and institutional capabilities
		Stg-1.CLG.5	Availability of the accurate data
		Stg-1.CLG.6	Prioritize the requirements
		Stg-1.CLG.7	Cope with the sector
App.L.2	Stage-2	Stg.2.CLG.1	Evaluating existing VLEs' implementation experiences and determining critical success factors
		Stg.2.CLG.2	Defining pedagogical and financial plans
		Stg.2.CLG.3	Identifying the right people, processes and products of the subsequent stages
		Stg.2.CLG.4	Lack of cooperation from other stakeholder
		Stg.2.CLG.5	Estimating the durations and precedence of tasks
App.L.3	Stage-3	Stg.3.CLG.1	Accessibility issues
		Stg.3.CLG.2	User likeness or acceptance
		Stg.3.CLG.3	Mange the complexity
		Stg.3.CLG.4	Technology limitation
		Stg.3.CLG.5	Different subject has different e-learning needs; choosing the most effective tools to facilitate learning
		Stg.3.CLG.6	Reviewing course content for pedagogical soundness
		Stg.3.CLG.7	Course suitable for multi-cultural diversity
		Stg.3.CLG.8	Consider intellectual property rights
App.L.4	Stage-4	Stg.4.CLG.1	Dedicated infrastructure
		Stg.4.CLG.2	Technical issue
		Stg.4.CLG.3	Managing timelines and communication breakdowns
		Stg.4.CLG.4	Variation in practices across different programs
		Stg.4.CLG.5	Lack of adaptability and customization in commercial systems
		Stg.4.CLG.6	If provider technical support is not local
		Stg.4.CLG.7	Lack of resources for in-house development and deployment
		Stg.4.CLG.8	Big selling in VLE (it is the bit that matter) in-house development and deployment
		Stg.4.CLG.9	Higher risk in-house development and

Appendix ID	*Stage*	*CLG ID.*	*Clg title*
			deployment.
App.L.5	Stage-5	Stg.5.CLG.1	Conducting formative evaluation
		Stg.5.CLG.2	Managing pilot conducting
		Stg.5.CLG.3	Choose suitable pilot users
		Stg.5.CLG.4	Lack of usability
App.L.6	Stage-6	Stg.6.CLG.1	System incompatibility
		Stg.6.CLG.2	Cope with the continuous upgrade process of VLE to new major and minor releases
		Stg.6.CLG.3	Report and resolve bug if the provider is not local (commercial product)
		Stg.6.CLG.4	Technical issues
App.L.7	Stage-7	Stg.7.CLG.1	Complexity when integrated with other systems
		Stg.7.CLG.2	Data migration in integration system
		Stg.7.CLG.3	Integration of new feature in the VLE
		Stg.7.CLG.4	Integration bugs
App.L.8	Stage-8	Stg.8.CLG.1	Migrating the data
		Stg.8.CLG.2	Get information from stakeholder
App.L.9	Stage-9	Stg.9.CLG.1	Foster staff awareness of the products and how to use it correctly
		Stg.9.CLG.2	Getting user experience right
		Stg.9.CLG.3	Get people to attend training sessions
		Stg.9.CLG.4	Different user needs
App.L.10	Stage-10	Stg.10.CLG.1	Overlap between the old and new system
		Stg.10.CLG.2	Time in lunch the VLE
		Stg.10.CLG.3	Consistency
		Stg.10.CLG.4	Maintaining access control and information confidentiality
App.L.11	Stage-11	Stg.11.CLG.1	Major issues occur in first year after go live
		Stg.11.CLG.2	Providing consistence technical support required to users
		Stg.11.CLG.3	Monitoring and updating of the e-learning environment
		Stg.11.CLG.4	Staff require learning new things
		Stg.11.CLG.5	Staff writing the material in different way.
App.L.12	Stage-12	Stg.12.CLG.1	Sustainability
		Stg.12.CLG.2	Keep up to date where policy changed
		Stg.12.CLG.3	Demonstrate positive change

Appendix M: Refined list of the risks associated with VLE system implementation

Nos.	*Key risks involved in VLE implementation*
Risk-1	Poor infrastructure (e.g. VLE is unreliable and slow)
Risk-2	Risk associated with picking the wrong solution (system fail, waste money and time)
Risk-3	System-related risk, technical risk
Risk-4	Lack of accessibility
Risk-5	Risk related to data loss (e.g. if server goes down)
Risk-6	Integration risk (new VLE not fitting with other systems in the HEI)
Risk-7	Unbalanced used of technology and unsustainability of courses
Risk-8	Lack of financial support
Risk-9	Copyright issue with the visual and audio material in VLE
Risk-10	Time management (risks of delayed schedule and timely delivery)
Risk-11	Service downtime
Risk-12	Lack of timely support
Risk-13	Employee retention risks
Risk-14	Failure to gather accurate requirements
Risk-15	Negative use of technology (e.g. students get saturated with media)
Risk-16	Bad technological functionality

Appendix N: Refined list of the tools and technologies integrated with the VLE system

Categories	*E-learning tools and technologies*
Web-based applications	• Internet or web • Online gaming technology • Cloud technology
Web communication technology	• Email • Web asynchronous communication • Two-ways audio • Online or live chat • Blogs
Collaborative web technology	• Wikis • Screen capture software • Polls (electronic voting system) and learner response systems • Whiteboard and discussion boards • Collaborative tools • Video conferencing (e.g. chat, webinar) • Personal respond system (PRS)
Interactive tools	• Two-way interactive video • Interactive whiteboards • Discussion board • Simulations and modelling tools
Digital media and storage technologies	• Digital technology for images, video, and audio. • Digital storage box
Multimedia tools	• Creative multimedia component • Video editing software • Podcasting • Animation software • Video and audio streaming and live audio/video streaming • Adaptive hypermedia
Social networking tools	• Social networking platforms such as Skype, MSN Chat, Microsoft Netmeeting, Facebook and Twitter • Web 2.0
Teaching and assessment tools	• Authoring tools • E-assessment tools • Electronic assignment submission • E-portfolios of learning • Electronic performance support systems • Learning activity design tool • Electronic resources (e.g. electronic textbook, online library) • Semantic web and linked data

Categories	*E-learning tools and technologies*
E-learning platforms	• VLE and online learning management systems (such as Moodle, Blackboard, Atutor, Ilias, Sakai and Kewl, Sharepoint, Desire2Learn, FirstClass, Future-Learn, Instructure Canvas, Coursera, Pearson Ecollege) • Open source technologies • Personal learning environment (PLE) systems
Mobile learning technology	• Mobile learning technologies; smartphones • 4g/3g FemtoCell • Wap (wireless application protocol) • 4g/3g networks for online devices • Handheld devices and multi-touch surfaces including tablet PCs, laptops, netbooks, iPods, and USB cameras
Office tools and hardware technologies	• Word processors and PowerPoint software • Movie maker software • Picture inversion, overlays, and framing • Liquid crystal display projector and screen • Programing editor technologies • Graphics tools • Powercam software

Appendix O: Refined list of the learning and teaching methods integrated with the VLE system

Categories	*E-learning methods*
Interactive learning	• Discussion groups • Interactive videos for learning • Interactive learning (e.g. integrate with social media) • Text-based discussions • Learner-content interaction • Interactive, personalized, and distributed learning method • Synchronous online audio/video conferencing and training • Use of simulations • Games-based learning
Collaborative learning	• Online classrooms • Collaborative learning activities • Participatory learning • Web seminars and broadcasts coaching • Video communications including chat, videoconferencing, personal web conferencing, electronic focus groups
Self-based learning	• Note taking and annotations (Oliver, 2000) • Asynchronous self-paced study • Online tutoring such as distance virtual classroom • Use of bookmarking (Bruck, 2010; Oliver, 2000) • On-demand learning • Distributed and mobile learning • Entertaining videos • Personal RSS feed • Integrate with reference management tools • Create virtual book shelves
E-assessment	• Online tests and questions • Creating computer-aided and web-based instructions • E-submission and e-assessment • Use audio feedback
Creative learning	• Use of online encyclopaedia and thesaurus • Hyper textual learning • Educational films and games or gamification • Create video content • Creating learning journal

Categories	*E-learning methods*
Other teaching and learning methods	• Use combination of resources • Lecture capturing • Reflective learning • Mobile learning • Flipped classroom • Content sharing • Active learning • Rich media presentation

Appendix P: Semi-structured interview questions for Case Study 1

1. Your name?

....

2. Your university?

………………………………………………………………………….

3. Your role in the university?

………………………………………………………………………….

4. Are you involved in VLE implementation directly / indirectly?

....

5. What stage of VLE system implementation are you at?

....

6. Which VLE system mainly your university are used? Why?

....

7. Does VLE system meet your needs?

....

8. Is it an in-house or external vendor product? Was that a strategic decision that time?

....

9. If it is an external vendor product then how did you select a vendor? (Process, procedure) Based on what? (Time, quality, cost…)

....

10. Could you please list critical success factors of VLE implementation?
    a. …………………………………………………
    b. ………………………………………………….
    c. ………………………………………………….
    d. ………………………………………………….
    e. …………………………………………………..

11. What do you like and what do you dislike about your current VLE system? E.g. features, functionalities?
   ....
12. When was last time you changed the VLE system in your university? Did you support the decision of changing the VLE system? Why?
   ....
13. At what stage of your VLE system implementation the university staff was engaged?
   ....
14. Do you feel any difficulties with your current systems? If yes, what?
   ....
15. What was your first impression when you start using it?
   ....
16. What do you expect from the new system?
   ....
17. What do you like and what do you dislike about the previous system?
   ....
18. In your opinion what is the most effective tools, technologies or methods that VLE system should include or support? In general
   ....
19. What technologies do you see as promising key enablers for learning solutions?
   ....
20. In your view, is the way teachers employ technology to support learning the measure of e-learning effectiveness? Or is the system, or a combination of both, or something else?
   ....

Pre-Implementation

21. What stages or steps were followed for your VLE system implementation lifecycle? (Duration for each steps or phase)
   ....
22. Which process was given more importance during each stage and why?
   ....
23. How long was the implementation process expected to be? Are there any timescales?
   ....

24. What level of support was needed from top management and how many resources were needed to be allocated?
....

25. How can a suitable VLE system be selected for HE? What we have to consider?
....

Implementation

26. What framework or model did you follow for your VLE system implementation?
....

27. Any limitations on the existing framework or model?
....

28. What is the requirement for the future enhancement in VLE systems?
....

29. What are the stakeholders for the VLE system? Which once are the most important? Why they are important? How should stakeholders in HE be identified?
....

30. Please mention some of the major events or factors and challenges faced in the implementation of VLE system?
....

31. Were there any events, drivers or factors that supported the project in reaching its goals? What were they?
....

Post-Implementation

32. How does your university capture the end-users' feedback and make any change in the implemented e-learning system?
....

33. How many training steps? How long for each?
....

34. Do you belief that the training sections are effective? Easy?
....

35. Is the support you are receiving sufficient or you need different supporting resources?
....

VLE Implementation Stages

36. What do you consider as a crucial step in the lifecycle of VLE implementation in general?
    ....
37. What new forms of learning (NFL) are expected to emerge in the future of e-learning?
    ....
38. What technology contributes to form e-learning?

    ....
39. Is there any resistance from the staff or from the students to change the traditional way of teaching and learning? In your opinion why?
    ....
40. Do you deploy risk analysis to decrease potential threats of risk? What is the strategy and at what stage in lifecycle?
    ....
41. How would you describe the best practice of VLE implementation (framework)? Has this practice been applied widely, occasionally or never?
    ....
42. Literature suggests that there are several lifecycle stages (phases) while implementing systems such as VLE system. These stages are presented in the following table.

Lifecycle stages	*Define the level of importance as High/ low/ medium*	*Comment (Why?)*
Review and analysis		
Decision making		
Planning		
Design		
Development and deployment		
Formative evaluation		
Review and bug fixes		
Integration		
Final release and go live		
Training and support		
Evaluation		

43. Can you think of any other stages that you come across before taking the adoption and implementation decision while implementing e-learning technological solutions?
....

BBL Adoption and Implementation Factors

44. Please list top 3 points:

- **Benefits** to HE if e-learning is successfully implemented
....
....

- **Risks** associated with e-learning system implementation
....
....

Thank you for participating

Staff Survey Questions for Case Study 2
Staff survey for a PhD research in

Framework for the good-practice-in-context in the implementation and use of VLEs in HEIs

Note:
The participant can leave any question un-answered or partially answered as per their suitability. Also, the length of the answer is dependent on the participant's own interest and it is not necessary to fill all the blank lines for an answer of a question. All information will be treated as strictly confidential. Your company as well as you will not be identified.

1. What is your role at XXX University?

   ……………………………………………

2. At what stage of the VLE implementation have you been engaged, and how?

VLE system implementation stages	*How?*
Review and analysis	
Decision making	
Planning	
Design	
Development and deployment	
Formative evaluation	
Review and bug fixes	
Integration	
Final release and go live	
Training and support	
Evaluation	
Other, please specify	

3. What do you expect from the new VLE system in terms of features and usability?
   a. …………………………………………………
   b. ………………………………………………….
   c. ………………………………………………….

4. How does VLE meet your needs?

   a. ……………………………………………
   b. ……………………………………………

5. Please list any difficulties that you have experienced or any limitations that the VLE has:
   a. …………………………………………………
   b. ………………………………………………….

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c. ………………………………………………….

6. What benefits have you gained from using the VLE ?
   a. …………………………………………………
   b. ………………………………………………….
   c. ………………………………………………….

7. Do you think the new VLE seems to be an improvement over the previous one and how?

8. Are you receiving sufficient support for VLE or you need other supporting resources? What other support would you require?
   a. …………………………………………………
   b. ………………………………………………….
   c. ………………………………………………….

9. After attending the training session, do you feel more confident in using the VLE system?
   a. Agree,
   b. Strongly agree,
   c. Neither agree nor disagree,
   d. Strongly disagree

10. Overall, how would you rate the training session?
    a. Excellent
    b. Very good
    c. Good
    d. Poor

11. Could you please list critical success factors of VLE implementation? In other words, what makes any VLE system successful?
    a. …………………………………………………
    b. ………………………………………………….
    c. ………………………………………………….
    d. ………………………………………………….

12. As a result of the VLE upgrade, do you think your attitude towards using TEL will improve?
    a. Definitely,
    b. Probably,
    c. Not sure,
    d. Probably not

13. What technologies do you see as key enablers that a VLE system should include, provide or support? Please provide ranking on a scale of 1-5 (where 5 indicates "most important" and 1 indicates "least important":

Some e-learning tools and technologies	*Rating*
Interactive tools (e.g. Whiteboards)	
Smartphones	
Social media (e.g. Facebook, Twitter)	
Handheld devices (e.g. iPods, USB cameras)	
Open source software	
Semantic web and linked data	
Adaptive hypermedia	
Immersive virtual environments	
E-portfolio	
Audio (e.g. Audio feedback)	
Video (e.g. Chat, conferences)	
Cloud technology	
Podcasting	
Video and streaming	
Games-based learning	
Graphics	
Blogs, wikis	
Web 2.0	
Simulation and modelling tools	
Collaborative environments	
Multimedia tools	
Programing tools	

14. What new forms of learning (NFL) are expected to emerge through e-learning in the future?

……………………………………………………………………………………………
……………………………………………………………………………………………

15. What do you expect from the future of e-learning in higher education?

……………………………………………………………………………………………

16. What should the decision process be for selecting a suitable VLE system for higher education? What aspects would one have to consider?
    a. …………………………………………………
    b. ………………………………………………….
    c. ………………………………………………….

Thank you for completing this questionnaire. Your response will be kept strictly anonymous.

Student Survey Questions for Case Study 2
Student survey for a PhD research in

Framework for the good-practice-in-context in the implementation and use of VLEs in Higher Education

Note:

The participant can leave any question un-answered or partially answered as per their suitability. Also, the length of the answer is dependent on the participant's own interest and it is not necessary to fill all the blank lines for an answer of a question. All information will be treated as strictly confidential. Your company as well as you will not be identified.

1. What do you expect from the new VLE system?
   a. …………………………………………………
   b. ………………………………………………….
   c. ………………………………………………….

2. Please list any difficulties that you have experienced or any limitations that VLE has:
   a. …………………………………………………
   b. ………………………………………………….
   c. ………………………………………………….

3. Are you receiving sufficient support for VLE or you need other supporting resources? What other support would you require?
   a. …………………………………………………
   b. ………………………………………………….
   c. ………………………………………………….

4. Have you used the previous VLE system which was used in Brunel University in the past few years?
   - If yes, please answer question 5
   - If no, please move to question 6

5. Do you think the new VLE system seems to be an improvement over the previous one? In what ways?

……………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

6. Are your tutors using the VLE in a way that meets your needs? Please explain.

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

7. What else do you need in VLE to support your learning process? Or to help you learn more effectively? Is there any feature or function you need and cannot find on VLE?
   a. …………………………………………………
   b. ………………………………………………….
   c. ………………………………………………….

8. What benefits have you gained from using VLE?
   a. …………………………………………………
   b. ………………………………………………….
   c. ………………………………………………….

9. Are you satisfied with the online parts/aspects of your course?
   A. Yes
   B. No

10. How could the online aspects of your course be improved?
    a. …………………………………………………
    b. ………………………………………………….
    c. ………………………………………………….

11. In your opinion, which technologies and tools can enhance further the VLE system?
    a. …………………………………………………
    b. ………………………………………………….
    c. ………………………………………………….

12. What is your expectation for the future of e-learning in higher education?
    a. …………………………………………………
    b. ………………………………………………….
    c. ………………………………………………….

Thank you for completing this questionnaire. Your response will be kept strictly anonymous.

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