The Integration and Use of ICT Across the Secondary School

Ruth Margaret Farmery

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Abstract

Many different technologies are available to support teaching and learning in schools and their role is a key topic for debate in contemporary education (Selwyn, 2011b; Lankshear & Knobel, 2006; Collis & Moonen, 2001). Evidence shows that although some technologies are adopted and used successfully within schools, others are not (Straub, 2009). This study was conducted in a technologically-rich secondary school where first-order barriers (Ertmer, 1999) were not expected to affect the use of ICT, and yet there are problems with the adoption of ICT across the curriculum. This study has followed two separate but connected lines of inquiry – how second-order barriers affect the integration and use of ICT and how ICT is used in practice. This includes the roles of the teacher, students and managers in terms of delivery and provision (Moyle, 2006; Eynon, 2010; Wastiau et al, 2013), with a particular focus on the implementation and use of a VLE and e-portfolios for end of Key Stage 3 assessment (Stefani et al, 2007).

Following a case study methodology, the research investigated the use of technology within a large secondary school in the South West of England. Data were gathered through the use of VLE logs, questionnaires and group interviews with Year 9 students, questionnaires and interviews with staff, and document analysis of lesson planning and the e-portfolios created by these students. The data shows that, despite good technology provision and access to resources, ICT use is variable within and between departments and despite the SLT vision for student-centred use of ICT, its use is mainly teacher-led. Issues such as how differences in understanding and interpretation of policy between SLT and teaching staff affect ICT use in practice and how teachers' beliefs affect their practice are identified.

By considering the role of second-order barriers on the integration of technology, the research examines the 'messy realities' of technology use in education. The key findings show the importance of the SLT and how their practice is central to implementing their vision for ICT use, the importance of the ICT department in supporting development of practice across the curriculum and how teachers' beliefs about students' home use of ICT affects their practice.

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Chapter 1: Introduction

1.1 Introduction

This thesis presents research conducted within a secondary school in England in order to explore the integration and use of ICT across the curriculum. The study has investigated two separate but connected areas of inquiry – how second-order barriers (Ertmer, 1999) influence ICT integration and use, and how ICT is used in practice – in order to identify how ICT can be developed to further support teaching and learning across the curriculum. Following Selwyn (2011b), a descriptive case study approach has been used to draw attention to:

> *"…the contradictions, compromises and conflicts that lie behind the realities of technology use in education." (Selwyn, 2011b, p. iix)*

In considering these *contradictions, compromises* and *conflicts,* three groups within the school were identified and investigated: the Senior Leadership Team (SLT), classroom teachers, and students. Crook (2012) states that it is important to understand the tensions and contradictions between the aspirations and needs of these groups in order to make more effective use of ICT in education. Therefore, recommendations arising from the study address how the school can develop ICT practice within each of these three groups.

1.2 Background to the Study

This section explains the reasons for undertaking the study and provides context for the research setting.

1.2.1 Reasons for Undertaking the Study

The issue of ICT in education is complex and, while it is accepted that ICT is not a 'silver bullet', it continues to play an important role in education (Underwood, 2014). Lankshear & Knobel (2006) and de Winter et al (2010) state that ICT has enabled new or more efficient ways of doing things and provides new tools that facilitate students'

construction of learning. Yet studies show that ICT use, particularly by students, remains limited (European Union, 2013) therefore developing understanding of how and why ICT is used and not used continues to be of interest.

Within the literature, explanations for the limited use of ICT distinguish between first order barriers that relate to ICT infrastructure and support and second order barriers such as organizational culture and teachers' beliefs (Snoeyink & Ertmer, 2001). In terms of the research site, the school studied here is of particular interest as its high quality ICT infrastructure (described in more detail below) is expected to eliminate first-order barriers (Ertmer, 1999). Instead, it is the role of second order barriers that becomes significant as, despite school policies that promote ICT as an integral part of planning 'good' lessons, its use by staff remains variable.

This study will add to research literature in terms of the realities of ICT use in the secondary school and add to understanding of the impact of teachers' beliefs on the use of ICT. Within the literature it is identified that there is still the need to develop an understanding of the relationship between education and ICT in terms of how and why ICT is actually used within educational settings, rather than concentrating on how it could or should be used (Selwyn, 2010).

1.2.2 School Profile

The school is situated in a small town in the South West of England and moved to new premises in 2010 under the new build scheme. The school holds Technology College specialism (DfES, 2003), and as part of this specialism developing the use of technology across the curriculum, including ICT, is viewed as important. In terms of student demographics, as is typical of the South West of England, the school has low numbers of ethnic minorities with 95% being of white-British origin and 2.8% of pupils believed to have a first language that is not English (RAISEonline, 2011). As noted by the RAISEonline data (2011), the school has below average proportion of students eligible for free school meals (8.4%) and above average proportion of students with special educational needs (SEN) (23%). In terms of staffing, there are seven members of the SLT and an additional seventy members of teaching staff. There are a further fifty

support staff, including cover supervisors, administrative Heads of Year and teaching assistants. IT support is subcontracted to a local firm.

Through external OfSTED inspection in December 2009 and subsequent Local Authority monitoring inspection in May 2010, it was found that the quality of teaching within the school was unsatisfactory. At this time the percentage of lessons graded good or outstanding was found by these external agencies to be 54% and 45% respectively.

In response to this OfSTED judgement and at the outset of this study, the SLT had recently introduced TEEP as the core strategy for teaching and learning across the school, including the focus on 'effective use of ICT'. Through whole school INSET training, all teachers were introduced to TEEP and the school's teaching and learning policy identifies that it is expected that all lessons are planned formally using the TEEP principles. The most recent OfSTED inspection, in 2012, judged the school as 'good' in all categories.

1.2.3 School IT Infrastructure

The school is well equipped with IT infrastructure, the majority of which was new at the time of this study. This comprises approximately 50 servers, including file servers, website and Virtual Learning Environment (VLE) hosting, 400 desktop machines and 540 laptops. As software was also bought new at this time, the school systems run Windows 7, with Office 2010 and Adobe CS5 collection, for example. The school has both wired and wireless network access throughout, with internet services being provided by South West Grid for Learning (SWGfL). All classrooms throughout the school have a wide screen interactive whiteboard (IWB) and visualizer, with many departments also having access to other peripherals such as digital cameras and SMART Response or ActivExpressions voting pads.

A number of the desktop machines are organized in dedicated ICT suites in the ICT, Design Technology and Music departments, with specialist hardware and software such as 3D printers and music recording and editing provision respectively. In

addition, the school has a TV studio and a 'Digital editing suite and Animation room'. Both these rooms are well equipped with Apple computers and a variety of cameras, lighting and sound hardware. Whilst these are primarily used for Creative Media courses at GCSE and A Level, the creative media team also support other subjects in making use of these resources to enrich learning across the curriculum.

In addition, all members of teaching staff, including the SLT, have a personal laptop supplied by the school and a number of staff have iPads and other mobile devices provided. All teaching rooms within the school have a desktop machine for dedicated staff use, and a large number of staff have offices, also equipped with desktop machines.

1.3 Research Questions

As stated above, the study focuses on two separate but connected areas of inquiry through the following research questions:

How second-order barriers affect the integration and use of ICT:

- To what extent do conflicts and contradictions between policy and practice affect the use of ICT?
- How do teacher beliefs affect their ICT practice?
- How is teacher knowledge, of policy, new technologies and the pedagogy of ICT, developed?

How ICT is used in practice:

- How is ICT used to support teaching and learning in practice, including how students, parents and teachers understand and negotiate their roles when using the VLE and e-portfolios

- To what extent is ICT use influenced by factors such as the students' 'digital literacies' and, in particular, the ways in which students access and use ICT in and out of school?

The questions were developed from the literature, as will be described further within chapters 2 and 3, and also consider the current situation of the school in terms of sustaining improvement following OfSTED judgements at the outset of the study. The introduction of e-portfolios for assessment of ICT at the end of Key Stage 3 is one example of how innovations in ICT use fare in practice. The portfolio was intended to allow students to present evidence of their ICT capabilities created in discrete ICT lessons, across the curriculum and at home in a single environment. In practice, however, it exposed many of the difficulties associated with using ICT in education, including how student use of ICT across the curriculum and at home contributes to their ICT capabilities, how both teacher and student perceptions of ICT affect their use of ICT, and how unanticipated concerns and problems undermine the effectiveness of the new technology. Through investigation of these questions, this study aims to build on existing literature and develop understanding of how and why ICT is used, in order to provide recommendations for further development.

1.4 Structure of the Thesis

The thesis is organized in seven chapters, beginning with this introduction outlining the reasons for undertaking the study, through to conclusions and recommendations for further study.

Chapter 2 presents the literature review, identifying potential problems with the integration of ICT in education and what factors promote successful ICT integration. In particular, chapter 2 focuses on the role of leadership, Continuing Professional Development, and the role of the teacher in ICT adoption. Chapter 3 focuses on ICT within education, outlining how and why ICT is used and also considers conflicts between ICT and education. Literature relating to the use of VLEs and e-portfolios is also explored, in order to provide context for the planned introduction of e-portfolios within the school studied. Chapter 4 describes the research methods and

methodology and explains the choice of case study. The research instruments and process of analysis are described. The ethical issues are discussed, particularly with respect to working with children and my position as insider researcher.

Chapters 5 and 6 present the data gathered. Chapter 5 considers why ICT use varies across the school, given the school's ICT infrastructure and resources. Chapter 6 describes how ICT is used, considering the use of ICT across the curriculum, students' use of ICT at home, use of the VLE, and the introduction of e-portfolios. Chapter 7 concludes by discussing the findings, evaluating the study and making recommendations for future research.

Chapter 2 Supporting Successful ICT Integration

2.1 Introduction

This study is concerned with two connected lines of inquiry, this chapter considers the literature relating to the first of these strands – how second-order barriers affect the integration and use of ICT. Many authors identify barriers to successful ICT integration. These barriers include: lack of access to hardware and software, poor software design, lack of shared vision for ICT use, lack of adequate professional development and lack of support and leadership (Kopcha, 2012; Wachira & Keegwe, 2011; Rezaei et al, 2011). In addition, a number of barriers identified relate to the teacher: their beliefs in terms of the efficacy of ICT, negative impact on teachers' time, teachers' lack of pedagogical knowledge, teachers' lack of confidence in their own ICT skills, teachers' fear of losing authority due to a changing role (Kopcha, 2012; Wachira & Keegwe, 2011; Rezaei et al, 2011).

Ertmer (1999) categorized barriers into first and second order groupings, where first-order barriers relate to external issues such as access to suitable hardware and software, and second-order barriers relate to internal issues such as teacher beliefs. It is expected in the school studied here that, due to the recent investment in IT infrastructure through the new-build process, first-order barriers do not have a significant impact on ICT use and therefore second order barriers are investigated in more detail. This chapter discusses successful ICT integration along with issues raised by literature in terms of the role of the Senior Leadership Team (SLT), the role of the teacher and the role of Continuing Professional Development (CPD).

2.2 ICT Integration and Innovation

Throughout the literature, a number of authors highlight issues relating to the implementation and integration of technology in schools (Zwaneveld & Bastiaens, 2010; Pittard, 2004; Higgins, 2003; Kanuka & Rourke, 2008; Collins & Halverson, 2010; Solomon & Schrum, 2007). This section outlines the integration process, including

factors that may lead to successful ICT integration, as are important for the school within this study to consider.

ICT integration is an on-going process for schools and teachers. Zwaneveld & Bastiaens (2010) identify three phases of implementation:

1. ICT is used primarily to automate existing processes

2. ICT is used to make some changes to the teaching and learning process

3. New systems of teaching and learning pedagogies are implemented.

The initial introduction of ICT may be facilitated using a top-down or bottom-up method. A top-down approach involves the introduction of the technology by the organization, with teachers expected to use it. A bottom-up approach is where teachers themselves introduce the technology and share this with colleagues (Zwaneveld & Bastiaens, 2010). It is likely that a combination of both these approaches is most effective, but it is critical for the school to have a culture where innovation and experimentation is encouraged and mistakes are allowed (Zwaneveld & Bastiaens, 2010).

For ICT integration to be successful, the fit between existing practices and promoted use of the technology should be considered for both teacher and school level factors (de Koster et al, 2011; Donnelly et al, 2011). ICT integration should first identify what 'good' learning is then look at how ICT can facilitate development, rather than focus on the technology (Ertmer & Ottenbreit-Leftwich, 2013). ICT integration may be in conflict with other school priorities, including external assessment and curricula where the focus may be on knowledge acquisition rather than knowledge creation (Hennessy et al, 2005; Yang, 2012). Bertram & Waldrip (2013) caution that teachers might make use of ICT because they feel expected to, rather than for meaningful pedagogic purposes. Where ICT use is linked to the existing pedagogical philosophy and practice of the teachers and school, a more positive impact may be seen (Underwood & Dillon, 2011). Differences arise both between and within schools in terms of how ICT is used

to support teaching and learning, particularly in different subject areas within the secondary school (Tondeur et al, 2007; Erixon, 2010; Sutherland et al, 2004).

Developing the use of ICT across the curriculum places a burden on teachers to develop new methods of teaching and learning that integrate technology, as highlighted above. Therefore it may take time before improvements, if any, are seen (Pittard, 2004; Higgins, 2003; Kanuka & Rourke, 2008). For many schools, this culture of innovation and tolerance of mistakes is in conflict with external pressures such as OfSTED and league tables of results where there is a perceived need for continual improvement (Vasagar, 2012). This pressure to show continual improvement may make schools and teachers reluctant to develop the use of ICT, if improvements are not readily apparent (Pittard, 2004; Higgins, 2003; Kanuka & Rourke, 2008). In addition, in order to embrace ICT, teachers and students have to adapt certain roles, values and attitudes to teaching and learning (Sangra & Gozalez-Sanmamed, 2010; Zandvliet & Fraser, 2004; La Velle & Nichol, 2000; Harris, 2002).

In summary, this section has provided an overview of ICT integration to illuminate the context of the study. While there are external and internal imperatives for education to make use of ICT, as will be discussed further in chapter 3, integration is not straightforward. ICT integration places a burden on both teachers and students in changing their approach to teaching and learning and also requires investment in time and money from the school. The study considers the three phases of ICT adoption noted above (Zwaneveld & Bastiaens, 2010) identifying how the school can develop its use of ICT. The following sections will describe, in more detail, a number of these aspects including the role of the SLT, the role of the teacher and CPD.

2.3 LEADERSHIP

The importance of the SLT, in particular the head teacher, in the use of ICT for teaching and learning is identified by a number of authors (Flanagan & Jacobsen, 2003; Schiller, 2002; Afshari et al, 2009; Gibson, 2002; McGarr & Kearney, 2009; Tondeur et al, 2008; Dale et al, 2004 and Yee, 2000). This section examines the role of the SLT in successful integration of ICT, including the role of policy and vision.

2.3.1 Role of the SLT

Leadership is particularly important for successful ICT integration, Moyle (2006) emphasizes the role of the head teacher and SLT in developing the use of ICT across the curriculum and stresses that the SLT should lead not just support ICT use. SLT vision and visible use of ICT by the SLT that supports this vision is needed (Newhouse, 2010; Lee & Gaffney, 2009). It is important to develop a whole school approach to ICT integration (Newhouse, 2010; Lee & Gaffney, 2009). However, as is identified above, the school may have other priorities for development that make a whole school approach complicated and expensive in terms of both time and money.

Moyle (2006) suggests that a transformational leadership style can be effective in promoting successful ICT integration identifies a number of aspects of school-leadership including:

- Development of a strategic plan that includes vision, goals and strategies for use
- Vision statement that incorporates ICT and shared staff knowledge of this vision
- School culture that encourages risk-taking, inquiry and reflection in teaching
- Whole-school approach to ICT where ICT use is seen as a natural part of school-processes
- Appropriate infrastructure, budget and provision for ICT

A lack of guidance by senior leadership in terms of implementing ICT policy may lead to innovation being isolated and limited to a few ICT enthusiasts (Franssila &

Pehkonen, 2005). This role of the SLT in leading the use of ICT includes a number of key leadership aspects such as leading effective integration through ensuring equality of access, developing a shared vision and ensuring effective CPD is in place (Flanagan & Jacobsen, 2003). CPD will be considered in more detail in section 2.5 below.

The pedagogical views of the SLT are key in terms of policy development, including policy relating to ICT use and the impact the SLT have on how teachers use ICT to support teaching and learning (Robertson, 2003; McGarr & Kearney, 2009; Schiller, 2002; Tondeur et al, 2008; Vanderlinde et al, 2012; Law et al, 2010; Vanderlinde, van Braak & Dexter, 2012). The head teacher and other members of the Senior Leadership Team lead the development of ICT within a school in terms of vision and ethos, and it is important for them to be seen to support the use of ICT by integrating ICT into their own practice (Baylor & Ritchie, 2002; Afshari et al, 2009). It is important for the SLT to be visible learners in the use of ICT alongside staff and students (Yee, 2000). This therefore places additional burdens on the SLT, not only to develop the strategic vision for ICT integration, but also to develop their own understanding and use of ICT alongside teaching staff, as discussed further below.

2.3.2 Policy

As mentioned above, one aspect of the role of the SLT is that of development of school policy with respect to the use of ICT and the implementation of national policies. School policy on the use of ICT in lessons is a factor in developing practice (Windschitl & Sahl, 2002; Lim & Barnes, 2002; Hernandez-Ramos, 2005). Variation between schools is identified in terms of how ICT is used and how national policy is implemented, leading to gaps between policy and practice that need to be investigated (Tondeur et al, 2007). Policies covering the use of ICT are formulated at school, local, and national level. These include, for example, the school's Teaching and Learning policy, Local Authority guidance on the use of new technologies, and national publications, from the DfE and other agencies such as Naace and Becta. The importance of ICT policy is explained in terms of its effect on the integration of ICT within teaching and learning (Cox et al, 1999; Vanderlinde et al, 2012). Where staff are

involved in policy development they may also develop shared understanding of how ICT is used to support teaching and learning (Vanderlinde et al, 2012).

Issues between policy and practice are identified whereby a lack of encouragement for use of ICT from senior leaders and issues of access are significant impediments (Murphy & Greenwood, 1998). In terms of national and local policy and practice, tensions may also arise as a result of a lack of shared vision with respect to pedagogy (Coutts et al, 2001).

The leadership style of the SLT is key to take up of ICT within the school and it is important that SLT are visible leaders of ICT integration. The SLT are responsible for the school vision and policy with respect to teaching and learning that sets out what makes 'good' teaching and learning within the school context. However, there may be other priorities for school development and development of ICT requires both time and money commitments from the SLT and all staff. As will be discussed further in section 3.3.2, the school studied here has identified the Teacher Effectiveness Enhancement Program (TEEP) method of lesson planning as signifying 'good' teaching and learning. In practice, how this vision is understood and implemented by classroom teachers affects the use of ICT and will be investigated within the study. The next section investigates the role of the teacher.

2.4 Role of the Teacher

As is indicated above, the integration of technology in the teaching and learning process places a burden on teachers in terms of their own technical skills and pedagogical knowledge required. Many authors identify the teacher as the most important factor in explaining why ICT is or is not used, and focus on teachers' beliefs as a barrier to ICT integration (Celik & Yesilyurt, 2013; Kreijns et al, 2013; Wastiau et al, 2013; Ertmer & Ottenbreit-Leftwich, 2010). This section discusses the role of teacher knowledge and skills, teacher role identity including how ICT affects the role of the teacher and investigates the role of teachers' beliefs in ICT integration.

2.4.1 Teacher Knowledge

Teachers make use of a range of knowledge in order to effectively do their job and the integration of technology into teaching and learning involves a knowledge base for teachers that is new and therefore needs to be developed through appropriate professional development (Mishra & Koelhar, 2006; Loveless, 2011). Mishra & Koelhar (2006) explain this concept as the qualities of teacher knowledge required in order to integrate technology within pedagogy. For ICT to support teaching and learning, pedagogy and what teachers need to know to successfully incorporate the technology must be considered (Mishra & Koelhar, 2006). This is referred to as Technological Pedagogical Content Knowledge (TPCK), shown below in figure 1.

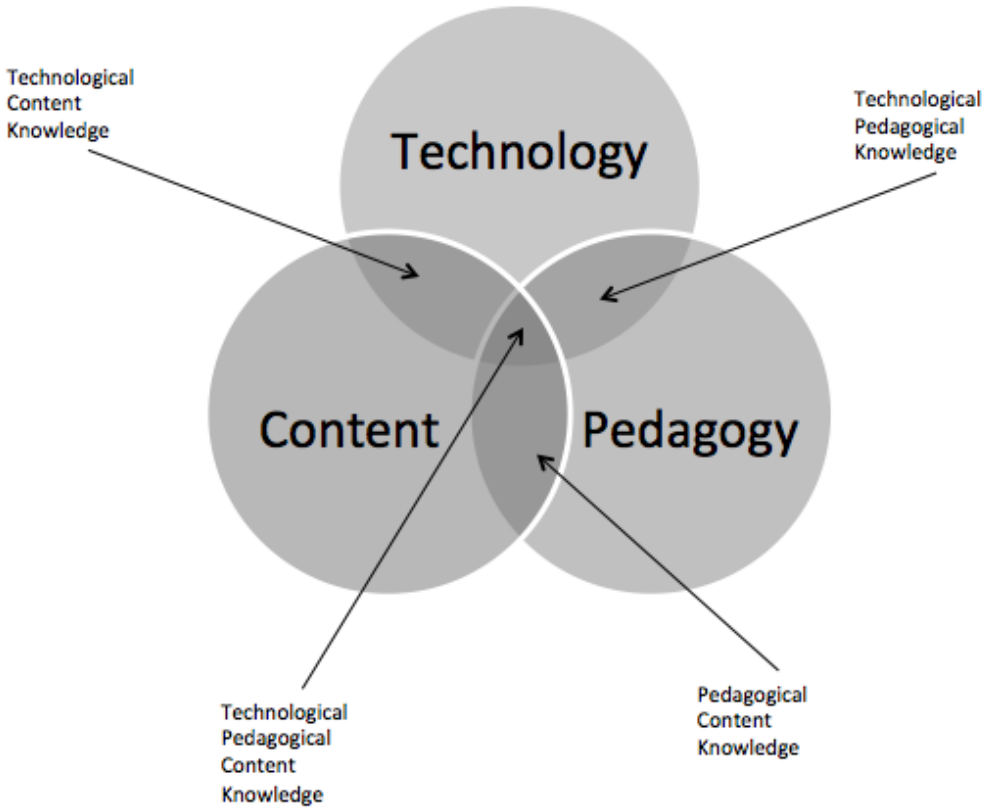


Figure 1: Pedagogical technological content knowledge (from Mishra & Koehlar, 2006, p1025)

Mishra & Koelhar (2006); Unwin (2007) and Voogt et al (2013) describe this model of teacher knowledge as including content, the subject specialist knowledge; pedagogy, knowledge of techniques of teaching and learning; and pedagogical content knowledge, based on Shulman's definition (Shulman, 1986). This definition sets out the

knowledge used to make the subject comprehensible to others and the requirements for teacher knowledge. It includes an understanding of how ICT can be used to provide forms of representation not available without the technology, knowing the range of technologies available to support teaching and learning and being able to choose appropriate technologies and pedagogic strategies to use.

Therefore, the rationale for CPD for teachers should focus on the technology alongside content and pedagogy, rather than see technology as a separate issue (Mishra & Koelhar, 2006; Price & Kirkwood, 2010; Chen et al, 2009). Harris et al (2009) also identify the added complexity of the rate of change of technology that makes keeping up with developments even more challenging and time consuming for teachers. Ertmer & Ottenbreit-Leftwich (2010) support this and emphasize the need for teachers to be given time to develop and establish new practices.

This section has identified that the use of ICT to support teaching and learning places a burden on teachers to develop new knowledge and skills to be able to integrate ICT effectively. Therefore, CPD is important in supporting teachers to develop this knowledge and skills, and is discussed further in section 2.5.

2.4.2 Teacher Role Identity

In addition to developing skills and knowledge of ICT and pedagogy, how teachers view their role and how they understand what 'good' teaching and learning is affects how they make use of ICT (Mumtaz, 2000; Ertmer et al, 1999). This section discusses teacher professional identity and the role of the teacher.

Teacher professional identity is influenced by school culture, classroom teaching context, teaching experience, teacher's own school and learning experiences and subject taught (Goodson, 1992; Knowles, 1992; Beijaard et al, 2000). Teacher professional identity directly relates to how the teacher perceives what is 'good' practice within teaching and learning for them (Ball, 2012a). Teacher professional identity affects teachers' ability to cope with change and willingness to implement innovation (Beijaard et al, 2000). Teacher identity includes both the personal and

professional, where both in-school and out-of-school experiences influence how teachers view themselves and their role (Prestridge, 2012; Halse, 2010).

The role of the teacher embraces a number of responsibilities including the design of the learning environment, managing people and resources, mediating student learning, and improving practice. Teachers who are confident in their subject-specific curriculum knowledge are more likely to innovate within their practice (Hartnell-Young, 2009). However, developments in the use of ICT make the role of the teacher more complex and require specific skills relating to the technology and pedagogy, which take time to develop (Webb & Cox, 2004).

In practical terms, ICT is described as encapsulating a changing range of tools and concepts (Hammond, 2004). It is noted that the ICT experience within the private lives of teachers is related to their use of ICT to support teaching and learning. Teachers might not make innovative use of ICT in school, if they do not use it themselves outside of the school environment (Underwood & Dillon, 2011).

There is a burden placed on teachers in terms of developing their knowledge, both of the technology and of appropriate pedagogy, thereby increasing teacher workload. In addition, teachers may see their role change as a result of technology integration and need support (Hennessy et al, 2010). Through CPD, teachers increase their own skills and this increase is personal skills often leads to an increase in confidence and likeliness to use ICT within the classroom (Lynch & Campos, 2014) but it is important for CPD to consider the contexts of teachers lives and of the school (Halse, 2010). Further discussion of CPD is outlined below in section 2.5 and the next section examines further how teachers' beliefs affect their use of ICT.

2.4.3 Teachers' Beliefs

Throughout the literature many authors refer to teachers' beliefs as having a significant impact on the integration of ICT, as teachers' beliefs are reflected in their classroom practice (Ottenbreit-Leftwich et al, 2010). However, teachers' beliefs are difficult to articulate, as they are often tacit and implicit in practice (Donnelly et al,

2011). This section considers teachers' beliefs further, including beliefs about pedagogy, attitude to the use of ICT, confidence and competence in using technology, and also the relationship between these aspects.

It is suggested that teachers integrate and use ICT in ways that support their existing beliefs in terms of student-centred or teacher-centred pedagogies (Palak & Walls, 2009; Ertmer et al, 2012). Liu (2011) suggests that while some studies find that teachers use ICT in ways that support their beliefs in terms of teacher-centred or student-centred learning, beliefs in student-centred learning are not always translated into practice. This may be due to time-constraints or external pressures such as curriculum and assessment requirements (Conlon & Simpson, 2003; Ertmer et al, 2012).

Kim et al (2013) focus on teacher beliefs in investigating why technology is integrated differently by teachers. They identify variances in how teachers view the efficacy of ICT and beliefs about student-centred or teacher-centred pedagogy in terms of what is considered to be effective teaching and the nature of knowledge and learning. Kim et al (2013) explain that these beliefs are connected, as how teachers view the nature of knowledge and learning affects their views of what is effective teaching and how ICT is used to support this. John (2005) identifies how teachers of different secondary school subjects integrate and view ICT differently based on how they view their subject. Meyer et al (2011) find that collaborative support from other teachers can develop positive beliefs in the use of ICT to support teaching and learning. Teachers need to have a positive attitude towards ICT to make use of it in the classroom and teachers who develop their own skills often have a more positive attitude (Kreijns et al, 2013).

Ertmer & Ottenbreit-Leftwich (2010) explain that teacher-level factors affecting ICT use include self-efficacy, but this takes time to develop. Teachers do not need high levels of personal ICT competence to use ICT in the classroom but need a high-level of personal confidence to make use of it (Loveless, 2003).

ICT integration is affected by second-order barriers, in particular teacher beliefs about their attitudes to ICT and skills (Mueller et al, 2008). Teachers' personal use of ICT

impacts on their professional use and ICT skills often take time to develop, particularly due to the changing nature of ICT. How teachers make use of ICT themselves directly relates to how they expect students to use it, for example teachers that use ICT to create multimedia content also set this as an activity for students whereas teachers who do not themselves use ICT to create multimedia content are unlikely to expect students to do this (Hsu, 2011). Teachers who choose to develop their own ICT skills often have a positive belief in the use of ICT to support teaching and learning (Meyer et al, 2011).

Hammond et al (2011) identify teacher-level factors affecting ICT use including subject taught, self-efficacy, and beliefs in terms of whether ICT has a positive impact on learning. Teachers who are confident in their own skills make more use of ICT and teachers who believe that ICT will have a positive impact on learning make more use of ICT. Teacher confidence and ICT competence is positively related to how they make use of ICT in the classroom (Wastiau et al, 2013). Also teachers who are more confident in their own ICT ability are more likely to make use of ICT in student-centred ways (Wastiau et al, 2013). Kreijns et al (2013) find that teacher confidence and competence are linked but the causal relationship is unclear.

Celik & Yesilyurt (2013) consider relationships between teachers' computer anxiety, self-efficacy, attitudes towards ICT use and use of ICT to support teaching and learning. They find that low anxiety, high self-efficacy and a positive attitude to ICT use are all indicators of likelihood to use ICT within the classroom and that teachers who develop positive attitudes to ICT also increase their confidence and decrease anxiety.

In summary, developing the use of ICT to support teaching and learning across the curriculum places burdens on teachers in terms of developing required knowledge and skills. As discussed above, the SLT set out the policy and identify what makes 'good' teaching and learning within the school context but it is up to teachers to implement this in practice. In addition to interpreting school policy, teachers' own assumptions, beliefs and experience affect how they view ICT and subsequently how they make use of it. This study will investigate how teachers' beliefs affect their practice. The role of

the teacher is complex and burdens are placed on teachers in developing knowledge of technology and pedagogy. Therefore it is expected that CPD is important in developing teacher knowledge, as is described further in the next section.

2.5 Continuing Professional Development

The importance of CPD has been highlighted above in terms of implementing the SLT vision for ICT, supporting teachers in developing knowledge and skills and addressing teachers' beliefs. This section explores in more detail the factors affecting ICT based CPD (Corfield & Pearson, 2007).

CPD, alongside effective leadership, is integral in enabling successful integration of ICT in teaching and learning (Finger & Pugh, 2004; Daly et al, 2009). In developing appropriate ICT provision, there is a need for relevant vision and guidance from SLT as school structures can inhibit CPD and, in particular, that CPD for ICT pedagogy and practice is often overlooked (Daly et al, 2009). While a great deal of money has been put into the professional development of teachers' ICT competence; the changing nature of ICT, as has been discussed above, means that it is important to continue to invest in training (Clark-Jeavens, 2004). Training should include a number of key elements including reflection, the ability to explore technology at own level, practical uses and support (Clark-Jeavens, 2004; Arntzen et al, 2008). It is also necessary to consider the social and cultural influences and contexts of ICT use, as ICT has personal, professional, social, cultural, political and economic significance, meaning and values (Clark-Jeavens, 2004; Arntzen et al, 2008).

CPD programs should be designed for the needs of individual or groups of teachers rather than a blanket approach, and teachers should be involved in the design of CPD to ensure that their own learning needs are considered (Wadmany, 2011; Donnelly et al, 2011). Both Newhouse (2010) and Lynch & Campos (2014) identify the need for schools to recognize the instructors' training needs, as often schools make use of other teachers within the school to provide training opportunities to their colleagues. Kopcha (2012) identifies mentoring as an effective CPD strategy whereby a sustained

two-year program of one-to-one support for teachers is put in place but recognizes the demand this would place on school resources.

There are a number of different aspects for CPD to encompass, in order to support teachers in integrating ICT: software skills, using ICT to support existing curriculum; changes to curriculum and pedagogy and changes to teachers' role that may occur as a result of using ICT. It is also important to focus on student use of ICT and pedagogy rather than teacher use of ICT (Rezaei et al, 2011), as this is highlighted as an area for development for many schools in a wide range of countries (European Union, 2013). Ertmer & Ottenbreit-Leftwich (2013) state that ICT tools change regularly due to the pace of technology developments but it is likely that pedagogical goals remain generally constant, therefore ICT integration and CPD should focus on pedagogy rather than the technology. Teachers need to develop knowledge of pedagogy of ICT use to make the most of ICT to support teaching and learning (Harris & Hofer 2011; Ertmer & Ottenbreit-Leftwich, 2013). Teachers face pressure to conform within school culture therefore a shared definition of 'good' teaching, that includes pedagogy of ICT use, is important to develop (Ertmer & Ottenbreit-Leftwich, 2010).

Minaidi & Hlapanis (2005), Kirschner & Davis (2003) and Franssila & Pehkonen (2005) all give models of progression for ICT based CPD with three main phases – acquiring skills, integrating technology into the current educational process and developing and changing practice through use of ICT that mirror the phases of ICT integration given above in section 2.2. These phases are summarized in table 1 below

Skill Level	Description
1	Developing competency with ICT for personal use and principles for ICT use in teaching.
2	A range of pedagogical uses of ICT including more interaction oriented ICT applications.
3	Using ICT for assessment; understanding policy and training to serve as pedagogical IT support for other colleagues.

Table 1: ICT skill levels for teachers, adapted from Franssila & Pehkonen (2005) and Kirschner & Davis (2003)

Some teachers need regular training in order to keep up with new hardware and software tools. However, effective CPD, in terms of developing the use of ICT to support teaching and learning, should not focus only on how to use software but also include time and space for teachers to share experiences and ideas (Christensen, 2002; Franssila & Pehkonen, 2005; Pachler et al, 2010; Bradshaw et al, 2011). Professional learning communities can be effective in developing ICT use (Wachira & Keegwe, 2011; Duncan-Howell, 2010; Triggs & John, 2004; McDermott & Archibald, 2010). Teachers who form communities of practice (Lave & Wenger, 1991) with colleagues and have technical and pedagogical support from the school are more successful in terms of ICT integration (Donnelly et al, 2011). CPD should allow teachers to have positive experiences with ICT and observe others that are successful (Mueller et al, 2008) in order to develop positive views of ICT.

Sections 2.3 and 2.4 above identified that CPD is likely to be important in developing teacher knowledge of school policy and pedagogy, as it was highlighted that teachers need to develop new knowledge to successfully integrate ICT, following Mishra and Koelhar (2006). In addition, CPD is likely to need to be an ongoing programme, as ICT changes are continual thereby placing a burden on schools and teachers to provide and make use of this training alongside other development requirements. A focus on pedagogy, as opposed to specific tools, is likely to be more productive due to the changing nature of these tools. However, as is noted above, some teachers may also require training in how to use ICT tools. For CPD to be most effective it should be tailored to the individual needs of each teacher, thereby placing a burden on the school in terms of time and money. While Kopcha (2012) identified that individualized one-to-one mentoring is most successful, in reality this is unlikely to be achieved due to time and money constraints. As described in section 2.4.3, teachers' beliefs and personal use of ICT affect how they expect students to use ICT to support learning and CPD is important both in developing teachers' own use of ICT and in allowing teachers to form communities of practice that develop and shape their beliefs and practice. The study will evaluate the CPD processes within the school and provide recommendations for development.

2.6 CONCLUSION

This chapter has examined the literature relating to the integration of ICT within the teaching and learning process. It shows that ICT integration is not straightforward and that ICT may in fact be in conflict with school structures. Ertmer (1999) identified first and second order barriers that affect ICT integration and this study will focus on the effects of second-order barriers as discussed above including leadership, CPD and the role of the teacher. Examination of the literature has identified the following research questions:

- To what extent do conflicts and contradictions between policy and practice affect the use of ICT?
- How do teacher beliefs affect their ICT practice?
- How is teacher knowledge, of policy, new technologies and the pedagogy of ICT, developed?

This study will examine how differences between policy and practice affect the use of ICT and will also look in more depth at the beliefs of the teacher, the underlying pedagogical assumptions and the effect of these on explaining these differences. This study will also examine further this development of teacher knowledge of policy, ICT advancements and of their relationship to pedagogy. The following chapter discusses literature relating to how ICT is used in practice.

Chapter 3 - ICT and Pedagogy

3.1 INTRODUCTION

The role of ICT in education is discussed by a number of authors e.g. Loveless (2003); Beetham & Sharpe (2007); Selwyn (2011b) and Livingstone (2012). Shahmir et al, (2011) demonstrate the complexity of the term ICT, encapsulating the parameters of its meaning as:

> *"Information technology is a combination of communication, reservation, processing and multimedia capabilities" (Shahmir, Hamidi, Bagherzadeh & Salimi, 2011, p370)*

It is this complexity of ICT in education that this chapter investigates, using published material. There is a wealth of literature promoting the importance of ICT in education and in everyday life including, for example, the Welsh Assembly Government (2008); McMillan & Morrison (2006); Webb & Cox (2004); La Velle & Nichol (2000); Collis (1999); Tondeur et al (2007); McCormick (2004); Thang & Wong (2010); Tas (2011); Yang (2012) and Loveless (2011). There are also numerous studies into the effect of ICT on teaching and learning, which establish this as a complex and contested issue (Condie & Munro, 2007; Harrison et al, 2003; Somekh, 2004). Livingstone (2012) provides a synthesis of various studies and finds that there is no conclusive evidence for the positive effect of the use of ICT. It is interesting therefore, that ICT continues to be promoted despite this lack of evidence.

This chapter provides an overview of ICT in education; including how technology use has developed and to what extent teaching and learning practices have changed as a result. Virtual Learning Environments (VLEs), including an exploration of one specific provider (Moodle) and the use of e-portfolios, are considered in more detail. These technologies are central to this study due to the research focus on the use of the school's Moodle VLE and an investigation of the introduction of Moodle-based e-portfolios within the ICT curriculum. This chapter concludes by examining student use

of ICT at home and how this contributes to their learning in school, as VLE use is seen as important in bridging the home-school divide.

3.2 Role of ICT in Education

The issue of ICT in education is complex and it is difficult to say unequivocally that ICT does or does not have a positive effect on learning, as there are social aspects of learning that should be included in the consideration (Tolmie, 2001). Various studies and media reports of education technology, such as the introduction of video and computer-based training, the micro-computer, multimedia and the World Wide Web, have identified expected benefits of technology in education (Oliver, 2006). However, there is still the need to develop an understanding of the relationship between education and ICT in terms of how and why ICT is actually used within educational settings, rather than concentrating on how it could or should be used (Selwyn, 2010).

Hague & Williamson (2009) identify that schools have a role to play in preparing students for participation in technology-rich environments of their future jobs and society, therefore it is important that schools make use of ICT to support teaching and learning. Hawkridge (1990) identifies four rationales behind the use of ICT in schools and, despite the age of Hawkridge's writing, these rationales are still evident within education policy today (DfE, 2011). They are:

- social – to prepare students for the use of ICT in everyday life;
- vocational – to prepare students for using ICT at work;
- pedagogic – ICT improves teaching and learning;
- catalytic – ICT can change what is taught and how.

It is evident that ICT has enabled change in both the process and content of learning. It has provided new tools for education that facilitate students' construction of learning and enabled new or more efficient ways of doing things (Abi-Raad, 1997; Boshuizen &

Woperis, 2003; de Winter et al, 2010; Hennessy et al, 2005). Wise et al (2011) consider use of ICT in music, identifying that the music industry makes use of digital technologies and this is changing the way music is taught in schools to include such technology. Wise et al (2011) identify challenges for music teachers in adapting to changes in technology and the curriculum, but find that the use of ICT raises achievement, particularly in composition tasks. Ott & Pozzi (2011) focus on cultural heritage education where the internet and World Wide Web have enabled museums to provide free digital archives of artefacts. Through the use of ICT tools such as pan and zoom, artefacts can be viewed from different perspectives and in a greater level of detail. In addition, historical objects can be contextualized and reconstructed as they would have been, giving particular examples of ancient Greek and Roman ruins. Using ICT allows for communication and knowledge sharing with a wider range of people, collaborative learning and personalized inquiry based learning (Ott & Pozzi, 2011).

Lehtinen's (2010) meta-analysis of ICT based studies identified four common themes in terms of students' learning – they learn more, learn faster, gain in terms of motivation, and improve social interaction – but that the inclusion of ICT does not inevitably lead to enhancements in learning. The positive motivational effects of ICT on pupils in terms of behaviour, learning and achievement are most likely when ICT is used to support both learning and teaching (Passey et al, 2003; Holley & Dobson, 2008). Hill et al (2012) state that students express preference for use of multimedia and 'entertainment' and a number of authors identify the use of the Interactive Whiteboard (IWB) to present media-rich content to students (Reedy, 2008; Liang et al, 2012; Slay et al, 2008; Twiner et al, 2010; Henessy et al, 2007; Heemskerk et al, 2014). However, teachers within Hill et al's study (Hill et al, 2012) suggest that this conflict between education and entertainment detracts from 'learning' where students are not actively engaged in reflection, discussion and interacting with others when consuming multimedia content. When students care about and enjoy what they are doing, they are more likely to learn and more likely to take part in 'difficult' activities (Resnick, 2004). Resnick (2004) and Wishart & Triggs (2010) highlight how museums work hard to provide engaging activities for children and other visitors. Madej (2003), in

considering the history of children's literature including digital productions, states that entertainment within education is not new and in fact these debates started in the 1700s when authors began to write enjoyable but educational children's literature. Madej (2003), Murray (2006) and Gee (2007) all identify how computer games are beneficial for learning. However, Craig & Amernic (2006) and Okan (2003) disagree and state that teachers should be concerned with 'education' not 'entertainment' seeing these as mutually exclusive. Okan (2003) suggests that where students expect learning to be entertaining, they are inadequately prepared for the 'hard work and serious study' that is required. This is in contrast with Resnick (2004), Madej (2003), Gee (2007) and Murray (2006) who identify how students develop resilience and are willing to 'work hard' when playing computer games, for example.

In terms of digital literacy and other learning skills, ICT can be used to support teaching and learning by making use of the internet to extend the learning network beyond the classroom (Law et al, 2002) as is discussed further below in terms of use of the VLE (section 3.4) and how students use ICT at home (section 3.6). ICT is also increasingly used to develop home-school links with parents by providing messages and access to information about their child and involving parents in students' learning (Selwyn et al, 2011; Zieger & Tan, 2012). However, there is a mixed reception from parents in terms of limited use of these systems and a lack of two-way communication. These methods also place pressure on teachers and increase accountability as parents and schools expect more from teachers via these communication routes (Selwyn et al, 2011; Zieger & Tan, 2012).

This section briefly outlined reasons for the use of ICT in education, but noted that this integration is not straightforward, with a number of authors contesting the compatibility of ICT and education. ICT is important within education in providing new or more efficient ways of doing things, and by motivating and engaging students through this use of ICT. However, ICT use is not a 'silver-bullet' and the way in which it is used requires consideration of pedagogy. The following section addresses pedagogy and practice within the secondary school.

3.3 PEDAGOGY OF ICT

The previous section illustrated the rationale for the use of ICT in education, and this section discusses further the pedagogy and practice associated with the integration of ICT across the secondary curriculum. This section includes a particular focus on the Teacher Effectiveness Enhancement Program (TEEP) (Ragbir-Day et al, 2008), the method of lesson planning adopted by the school in this study. This is important, as the culture of the school, particularly with respect to beliefs about what constitutes 'good teaching', has significant impact on how ICT is used (Windschitl & Sahl, 2002; Lim & Barnes, 2002) as discussed in chapter 2.

3.3.1 Pedagogy and Practice

The discussion of pedagogy relating to the use of ICT frequently centres on constructivism and behaviourism (Jeffries et al, 2007). Jeffries et al (2007) describe these philosophical standpoints as characterising how teachers and students interact and equate behaviourism with a teacher-centred model of teaching and learning and constructivism as a student-centred model. Constructivism, often described as based on the ideas of Piaget (1977) and Vygotsky (1978), is defined by Duffy & Cunningham (1996) as:

> *"Learning is an active process of constructing rather than acquiring knowledge and instruction is a process of supporting that construction rather than communicating knowledge." (Duffy & Cunningham, 1996; p. 171)*

One way in which teachers demonstrate their ideology is through the use of ICT tools (Leidner & Javenpaar, 1995; Jeffries et al, 2007) and so a consideration of behaviourism and constructivism is particularly pertinent to this study. Dillon (1998) provides a comparison of the main viewpoints, shown below in table 2.

Behaviourist	Constructivist
An objective view of knowledge; Serial structuring of material and program control; Regular review and testing against pre-specified criteria.	A provisional view of knowledge; Flexible approaches to interaction with equipment; Attention to the social context of learning.

Table 2: Behaviourist and constructivist viewpoints (Dillon, 1998, p34)

Although this comparison appears to indicate that either position is compatible with the use of ICT in teaching, often the use of technology reinforces behaviourist pedagogy (Attwell & Hughes, 2010). The use of 'drill and practice' software and the use of technology to enhance teacher presentation support behaviourist pedagogy, and so behaviourist pedagogy can be viewed as knowledge instruction and constructivist pedagogy as knowledge construction (Gibson, 2001). As described in chapter 2, ICT integration aims to develop student-centred pedagogy, as this is seen as more effective in terms of how ICT can be used to support teaching and learning (Ertmer et al, 2012; Ertmer & Ottenbreit-Leftwich, 2013). However, in their studies, Windschitl & Sahl (2002), Lim & Barnes (2002) & Reedy (2008) found that ICT is used more frequently in lessons for teaching than for learning, i.e. supporting the teacher, particularly the use of ICT to enhance teacher presentations, rather than supporting the learner. This is important here, as this study will investigate how ICT is used within the school, paying attention to whether ICT use is teacher or student led in practice.

Pelgrum (2001) describes greater technology adoption as moving from an industrial to an information society and while these ideas may be contested, they imply a move from a manufacturing economy to a 'knowledge' or 'information' based economy (Castells, 2010; van Weert, 2004). Table 3, below, summarizes the expected changes in education that follow from this transition to a knowledge based economy (Pelgrum, 2001).

Actor	Education in the Industrial Society	Education in the Information Society
School	Isolated from society Most information on school functioning confidential	Integrated in society Information openly available
Teacher	Initiator of instruction Whole class teaching Evaluates student Places low emphasis on communication skills	Helps students find appropriate instructional path Guides students' independent learning Helps student to evaluate own progress Places high emphasis on communication skills
Student	Mostly passive Learns mostly at school Hardly any teamwork Takes questions from books or teachers Learns answers to questions Low interest in learning	More active Learns at school and outside school Much teamwork Asks questions Finds answers to questions High interest
Parent	Hardly actively involved in learning process No steering of instruction No life-long learning model	Very active in learning process Co-steering Parents provide model

Table 3: Expected changes in education from industrial to information society (Pelgrum, 2001, p164)

Pelgrum's (2001) view of education in the information society is particularly pertinent to this study as it closely links with the ideas of TEEP (Ragbir-Day, et al; 2008) and is investigated further in the next section.

3.3.2 Teacher Effectiveness Enhancement Programme (TEEP)

The TEEP programme focuses on an approach to lesson planning that puts student-centred learning at the core of the teaching and learning process and explicitly identifies 'core underpinning elements' that lead to good learning outcomes, including the 'effective use of ICT' (Ragbir-Day et al, 2008). The TEEP model, shown below in table 4, demonstrates how the programme is reflective of Pelgrum's (2001) view of learning in the information age: for example, by putting 'effective use of ICT', 'thinking for learning', 'collaborative learning' as explicit elements of lesson plans.

TEEP Section	Description
Six-part Learning Cycle	Prepare for Learning Agree Learning Outcomes Present New Information Construct Meaning Apply to Demonstrate Review
Underpinning Elements	Assessment for Learning Collaborative Learning Effective use of ICT Accelerated Learning Thinking for Learning
Key Behaviours	Effective Learner Behaviours Effective Teacher Behaviours

Table 4: Details of the TEEP Model (Ragbir-Day et al, 2008)

Ragbir-Day et al (2008) relate the TEEP cycle to the constructivist teaching cycle developed by Scott (1987). This study makes use of this classification when investigating why ICT is used within the school in terms of identifying the educational practices established by the school and how the use of ICT affects teaching and learning. The relationship between the TEEP model and Pelgrum's (2001) view of learning, as demonstrated above, is important here, as the school studied has integrated the TEEP model across the taught curriculum.

In summary, discussion of pedagogy and ICT often focuses on distinctions between student-centred and teacher-centred practices. While teacher use of ICT is important, the school in this study needs to develop more student-centred practices with ICT. Through the promotion of the TEEP lesson planning process, it is implied that the SLT in the school studied here expect ICT to be used in student-centred ways. This study will investigate how 'effective use of ICT' is interpreted by both the SLT and teaching staff and how this is applied in practice within the classroom.

3.4 Virtual Learning Environments (VLEs)

VLEs were introduced into education in the late 1990s (Britain & Liber, 1999) and attained increased adoption throughout the early 2000s (Britain & Liber, 2004). The government at the time set a target of all schools in England to have a VLE in place by

2008 (DfES, 2005a) and, while this goal has been withdrawn, most institutions value and continue to use their VLE (Becta, 2010a). However, across the literature there are varying definitions of what constitutes a VLE (Wilson, 1996; Becta, 2003; Britain & Liber, 1999) and variance in the terminology used around VLEs and their usage (JISC, 2007; Schulmeister, 2005). This section outlines what a VLE is within the context of this piece of research, and discusses the specific example of Moodle VLEs as this is the provider used within the school and the pedagogy associated with the use of this technology.

3.4.1 How VLEs are Used

Wilson (1996) and Becta (2003) both provide similar and simple definitions of a VLE:

> *"A virtual learning environment (VLE) is a standardized, computer-based environment that supports the delivery of web-based learning and facilitates on-line interaction between students and teachers." Becta (2003, p1)*

> *"...a computer-based environment that allows interactions and encounters with other participants and access to a wide range of resources" Wilson (1996, p8)*

These definitions provide a starting point for the discussion of VLEs with figure 2 below outlining typical functionality provided by the software.

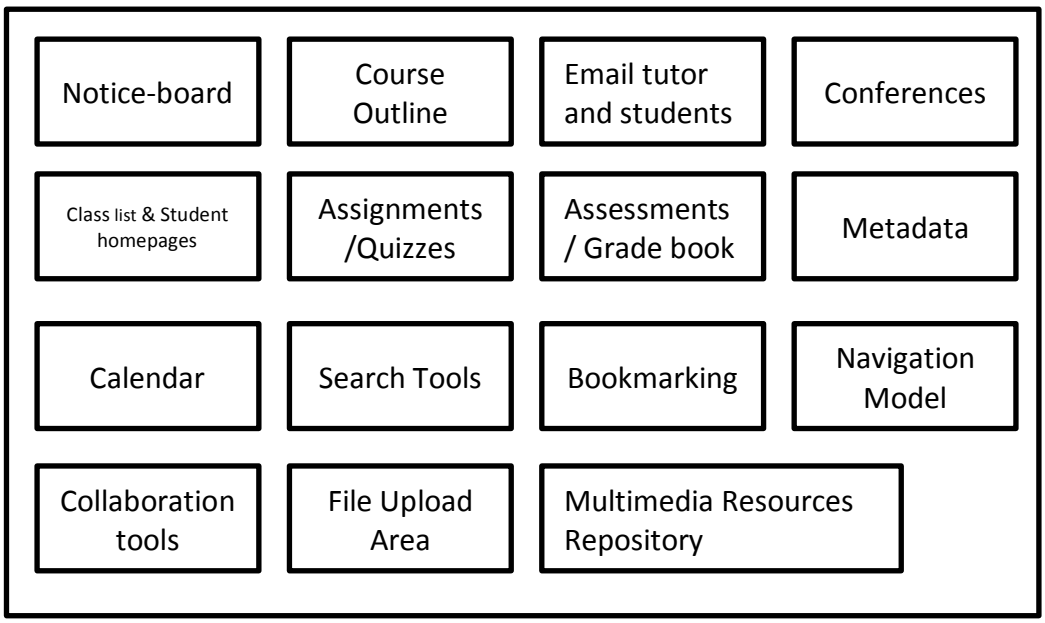


Figure 2: Typical VLE functionality (Britain & Liber, 1999, p5)

Whilst this description is over ten years old, it covers the basic functionality provided by most VLE software, however it is noted that frequently VLEs are mainly used as content repositories and for online forums (Richards, 2006; Jensen, 2009). Where VLEs are used for their ability to provide access to course materials, the collaborative and communication tools, which are important features, are not used as often (Richards, 2006; Jensen, 2009).

Considering Moodle VLEs in particular, once set up, the institution must then choose and develop a structure of *categories* and *courses* and, whilst advice is given in terms of user experience and usability, training is an issue. Although a strength of Moodle is that teachers can modify the structure and add content at any time, thereby increasing flexibility, there are training implications for using Moodle that should be noted. This training for teachers includes developing their understanding of how students can use the VLE, in addition to the technological and pedagogical training for using the VLE to support teaching and learning (Chao, 2008; White, 2010; Kilon et al, 2010).

It is important to consider the design of the user interface and its impact on use and non-use of ICT. Wilson & McKinney (2012) state that issues with HCI can limit ICT use and identify particular issues with the VLE in their study that led to its failure in terms of difficulties users had in understating how to use the system. User acceptance of technology can explain why some technologies fail to be successfully integrated (Wadmany, 2011) and user interface design can make the difference between use and rejection of a technology (Cho et al, 2009). Human Computer Interaction (HCI) is important for student use of ICT in allowing students to make use of the software or hardware easily and to avoid complicated tools conflicting with learning aims (Bower, 2011; Luik, 2011). Inkpen (1997) explains that HCI design should also consider student and teacher uses, as their needs of the software will differ because their reasons to use the software are different. Teachers' goals are more usually related to productivity and completing a work-based task whereas students make use of the software as directed by their teachers and are often focused on entertainment, as was discussed above.

The web-based nature of the technology allows for anytime, anywhere access, therefore extending the educational campus and environment beyond the space and time of the traditional school day (Buckingham, 2007). While this benefit has long been highlighted by proponents of VLEs, it is only recently through increased availability of wireless networks and increased adoption of mobile devices, that this has been the case (Searson et al, 2011). Nonetheless, the web-based environment extends the education environment beyond the time and place it operated in the past. It is important for schools to note here that this ability to extend the education environment provides for both distance learning and blended learning, and that there is a difference between the two forms. For the secondary school sector, it is perhaps blended learning that is more applicable to the current ways of working (DfES, 2005a) where activities make use of VLE functionality both within and beyond the classroom (DfES, 2005b; Britain & Liber, 2004).

3.4.2 Policy and Pedagogy Relating to VLEs

When still an advisory body, Becta (British Educational Communications and Technology Agency) had the role of developing policy on the use of technology in education and so may have a biased opinion on the effectiveness of VLEs. However, they provide an interesting reason for adoption. Becta's claims in terms of efficiency, effectiveness and benefits to all pupils will be investigated as part of this study:

> *"Used effectively, learning platforms open up learning opportunities for all pupils in school and extend learning outside the classroom and school. Effective communication and collaboration help make teaching more efficient. Learning platforms also enable school leaders to develop new practices to manage and monitor learning and teaching outcomes." (Becta, 2009, p2).*

It is an expectation, and core-teaching standard, (DfE, 2012) for teachers to set homework for students to support and continue learning outside the classroom and this is an area where the VLE can be used. It is suggested that use of technology, such as the VLE, can lead to a higher percentage of students completing homework than would have done when using non-technological methods (Konrad, 2003; Thurston,

2005; Owen et al, 2006). However, the use of VLEs and other ICT-based homework may in fact deter students and those who make little use of the VLE and therefore fall further behind as a result (Maltby & Mackie, 2009; Piccoli et al, 2001; Habib & Sønneland, 2010). In addition, discussed further below in section 3.6, issues relating to the digital divide are raised when ICT is used for homework (Somekh, 2004; Iske, et al, 2008; Stevenson, 2008; van Braak & Kavadias, 2005).

Pedagogy specifically relating to online learning is an area that needs further development and understanding (Thomas, 2010; Jennings, 2005; Britain & Liber, 2004; Deepwell & Malik, 2008). The previous section discussed the pedagogy of the use of ICT in education, considering constructivism and behaviourism, and this section builds on the discussion in terms of developing the pedagogy of online learning. Although VLEs can be considered an 'online classroom', learning in a VLE requires a different approach due to the differences between the VLE and a traditional classroom (Jennings, 2005; Britain & Liber, 2004; Deepwell & Malik, 2008).

Moodle is designed to support a social constructionist theory of learning (Moodle, 2011). Social Constructivism is based on the ideas of Piaget (1977) and Vygotsky (1978) and views learning as a social activity and emphasizes the importance of culture and context when constructing meaning (McMahon, 1997). Constructivist theories of learning are viewed as well suited to online, collaborative learning environments (McMahon, 1997; Neo, 2003) and the VLE can be used by both students and teachers to facilitate constructivist and collaborative learning. This includes enabling access to content and activities while also giving students a method of providing feedback (Neo, 2003). Social constructionism shares these ideas and identifies that learning takes place when the learner is constructing something to demonstrate their understanding, particularly when shared with others (Papert, 1991; Ackerman, 2001). This links with aspects of the TEEP lesson planning cycle described above in terms of the 'construct meaning' and 'apply to demonstrate' phases. However, there are challenges for teachers in implementing constructivist practice including, for example, teachers' own conceptual understanding, compatibility with external policy such as examinations as well as practical classroom aspects (Windschitl, 2002). In particular, the focus may

often be on the activity being undertaken rather than the learning outcome (Windschitl, 2002).

In terms of wider definitions of social constructionism, a social constructionist approach identifies that it is important to investigate meanings, values, behaviours, understandings and challenges as they are understood by participants (Burr, 1995). A social constructionist approach is concerned with meaning and understanding in social interaction and how this is embedded in socio-cultural processes (Lock & Strong, 2010). Social constructionism considers how knowledge is developed cooperatively through implementation of shared meanings (Gergen, 2001; Raskin, 2002) and, therefore, understands knowledge as something created through social processes (Allen, 2005). This study will investigate how ICT use is shaped considering the motives of those involved and nature of conflicts by focusing on interaction, processes and social practices (Young & Collin, 2004).

A social constructionist perspective considers a focus on power, in terms of whose definition is embedded in policy and guides professional practice, and how conflicts, tensions and contradictions influence how policy is interpreted (Ball, 2012b). The importance of power and control, compromise and conflicts in terms of how policy is developed and implemented is recognised, in terms of why some accounts become dominant and others do not (Raskin, 2002; Allen, 2005; Ball, 2012b). It is noted that there are often differences in interest, values and purpose between SLT and classroom teachers that may affect how school policy is developed and interpreted (Ball, 1993). For example, SLT may be more focussed on strategy and performance indicators than classroom teachers who may be more concerned with their day-to-day classroom practice. In terms of the micro-politics of the school, some instances of democratic participation with class teachers being involved in policy development and instances of SLT deciding and developing policy without input or consultation have been researched, with studies (e.g. Ball, 2011) showing that the nature of control and how decisions are made within the school is complex. It is therefore important to develop understanding of contradictions and compromises between policy and practice (Ball, 2011).

With respect to studies of educational technology, Selwyn (2012b) emphasises the need to avoid technological determinism and consider the complex cultural and social processes in which technology is used – or not used – as adoption of a technology is closely linked to the social context in which it is deployed. Technological determinism is prevalent in media interpretations of technology and can often be noted within policy documents from, for example, Becta (Elle et al, 2010). A deterministic viewpoint sees technology and technology development as unproblematic and autonomous from society, but that technology 'causes things to happen' (Jones & Bissell, 2011). Technological determinism seeks to identify the 'impact' of technology on society (Elle et al, 2010; Jones & Bissell, 2011; MacKenzie & Wacjman, 1999; Mackay & Gillespie, 1992; Williams & Edge, 1996). It is therefore important to consider how institutional, structural and wider social contexts influence and shape the technology, as technology is only one factor that should be considered alongside political, economic, cultural and social factors (Klein & Kleinman, 2002; Winner, 1993; Williams & Edge, 1996; Mackenzie & Wajcmann, 1999).

Returning to constructivst theories of learning, the pedagogical underpinnings of Moodle are further explained by Dougiamas (1998; 2011) who states that Moodle started as a result of his (Dougiamas') study in educational technology. Dougiamas (2011) clarifies the underlying principles as:

- All participants have the potential to be teachers as well as learners and should be both
- Creating for others provides a powerful learning experience
- We learn from observing our peers
- The learning environment should be flexible and adaptable to better tailor the experience to the participants
- Understanding the context of others allows for better teaching

These underlying principles of Moodle are expressed in the features Moodle offers, including where students interact with the course material and where students interact with each other (Cole & Foster, 2008). Although the majority of use of tools in the Moodle installation are for non-interactive content, it has been shown that students logging in to find and download files are then drawn into more interactive content and can be, as a result, more engaged in the course (Bogdanov & Stanislav, 2011; Rice, 2006; McMullin, 2005).

This section has described the expected use of VLEs within education, particularly with respect to the Moodle provider used by the school within this study. Use of the VLE requires teachers to change their practice and therefore has training implications, as previously discussed. The ease of use of the user-interface is significant in terms of uptake of the VLE where problems in understanding how to use the technology inhibit its usefulness. VLEs can extend learning outside the time and space of the classroom, and this is identified by the Senior Leadership Team (SLT) as an area for development for the school studied here. The study will investigate how the VLE is used to bridge the home-school divide. However, it is important to consider issues relating to the digital-divide, as will be discussed in section 3.6. One specific function of the VLE is to allow the student to collate evidence of their learning in an e-portfolio; the following section provides an exploration of the literature relating to this aspect of the VLE, that of e-portfolio creation, and use and goes on to consider this alongside the assessment process.

3.5 E-PORTFOLIOS

The aims of this study include the identification and observation of the negotiation of roles between the student, parent, and teacher in the creation of e-portfolios and will make use of a Moodle *block* to facilitate this. Having described the Moodle VLE above, this section explains what e-portfolios are, how and why e-portfolios are used within education.

The Department for Education and Skills (DfES, 2005a & DfES, 2005b) guidance issued in 2005 required all schools to have a learning platform "capable of supporting an e-portfolio" (DfES, 2005a) but the understanding of what constitutes an e-portfolio has been varied, with many authors seeking to define the concept (Wall et al, 2006; Becta, 2007; Chalfen, 2004; Irvine & Barlow, 1998). Hartnell-Young (2006) defines e-portfolios as.

> *"...containers for selections of digital items – whether audio, visual, text, or a combination of these – generally used to show individual learning." (Hartnell-Young, 2006, p279)*

A number of central themes arise in this definition with the idea of e-portfolios as a 'digital repository of artefacts' (Tosh & Werdmuller, 2004), the notion of 'purposeful aggregation' of these artefacts (McAllister et al, 2008) and the importance of self-reflection emphasized in a number of definitions (JISC, 2008; Tosh & Werdmuller, 2004; Barrett, 2007; Cotterill, 2007).

The idea of an online learning portfolio, or e-portfolio, is not new and is a logical development of the paper-based portfolio (Kim et al, 2010). Formal education in England has used paper-based portfolios for assessment since the 1980s where they were commonplace in NVQ (National Vocational Qualifications) awards (Ravet, 2005). However, at the outset of this study, e-portfolios were at an early stage of development and adoption (Stefani et al, 2007). As e-portfolios are by nature hyperlinked, students can make links between various artefacts and external sources demonstrating their understanding and allow for easier portability. E-portfolios are frequently web-based and this is the case in this study, as the VLE will be used to create and access them.

Concerns about the use of e-portfolios are addressed later, the perceived benefits to the learners and institution in the use of e-portfolios are discussed and summarized below in figure 3 (JISC, 2008; Becta, 2007; Stefani et al, 2007).

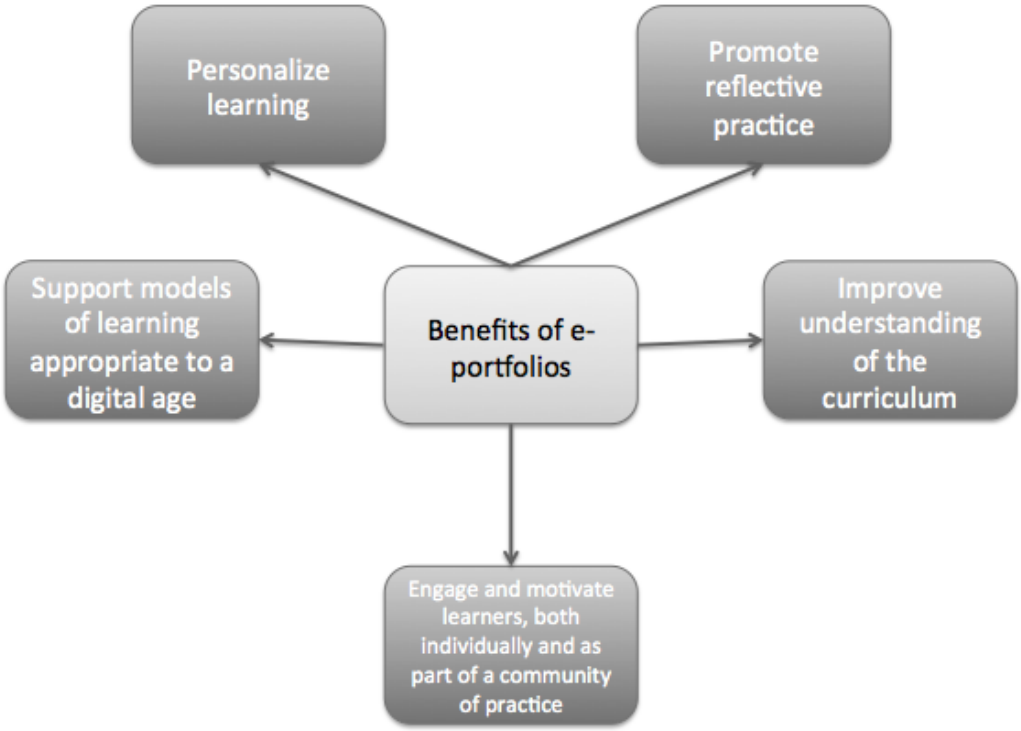


Figure 3: Why e-portfolios matter, adapted from JISC (2008)

E-portfolios are viewed as a means of increasing engagement and motivation in students; developing skills of goal setting, self-evaluation and reflection, allowing for various learning styles and can be used for feedback and collaboration (Becta, 2007; JISC, 2008; Stefani el at, 2007; O'Rourke, 2010). E-portfolios enable students to assume more responsibility for their learning, to develop reflective skills, and enable assessment of learning (Meyer et al, 2011; Garrett, 2011). Self-assessment is an important skill for students to develop (Black & Wiliam, 1998) and e-portfolios are seen as a way of developing these skills (Boud, 1995; Andrade & Du, 2007; Nicol & McFarlane-Dick, 2006; Arter & Spandel, 1992; Andrade & Valtcheva, 2009; Hanrahan & Isaacs, 2011). Marriott & Chomba (2010) suggest that by encouraging students to select their best work for inclusion within their e-portfolio, student reflection and self-assessment can be developed.

The construction of the portfolio is a learning experience in itself (Wall et al, 2006; Hartmann & Calandra, 2007; Kankaanranta, 2001) and is particularly highlighted through the views of the students in the study of Wall et al (2006):

> *"...It's a great way to learn and to look back on your work. You can look back at methods you've used, for example in maths. It also helps you to learn a lot about computers and that's good because computers are needed." (Wall, Higgins, Miller & Packard, 2006, p270)*

Clegg et al (2005) identified that learning, even when centred on personal reflection, is enhanced by collaborative working. Students in their study highlighted the importance of peer feedback in collaborative working and the effect that sharing work with others has on the effort expended:

> *"...To open a discussion, to publish work or ask a question, in short to let people know where you are in knowledge, thinking and questions is the only way to learn and get the support you need. The feedback and comments are essential to learning." (Clegg, Hudson & Mitchell, 2005, p10)*

> *"I think the realization that others were going to see your work made me more reflective and critical of my work to date" (Clegg, Hudson & Mitchell, 2005, p12)*

In terms of assessment, e-portfolios allows for formative and summative assessment of evidence created over a period of time (Evans & Powell, 2007). Other facilities of the VLE include the use of quizzes that, in contrast, provide a more traditional style of timed assessment through questioning and instant feedback that can be built in (Evans & Powell, 2007). E-portfolios are a more appropriate method of evaluating and assessment the ICT skills of pupils over time, as is similar with paper-based portfolio assessment that is traditional in arts based subjects (Newhouse & Nijru, 2009; Madeja, 2004; Irvine & Barlow, 1998; Evans & Powell, 2007).

Whilst the use of e-portfolios is viewed to be worthwhile for the purpose of assessment and in developing self-evaluation skills, there are concerns to be taken account of (Evans & Powell, 2007; Stefani et al, 2007). For example, e-portfolio construction can be time-consuming for students, particularly if the portfolio is to be done well (Evans & Powell, 2007). Le & Lin (2010) state that e-portfolio systems should consider students in terms of their attitudes towards e-portfolios and how they would like to use the system in order to produce a successful system. Newhouse

(2011) supports this by explaining that the use of e-portfolios requires a suitable e-portfolio management system.

The use of e-portfolios will create a need for training, for both students and staff, and introducing such a system involves an input of time and commitment to their use from all parties (Stefani et al, 2007). In addition, as discussed previously, access for some students can be problematic and not all students find the use of ICT to be motivational (O'Rourke, 2010).

This study will investigate the introduction of e-portfolios for assessment of students' ICT capabilities at the end of Key Stage 3 to allow for holistic assessment of evidence created in ICT lessons, across the curriculum and at home. The e-portfolio creation process will allow students to review and evaluate their progress, and allow for feedback from peers and teachers, as is described above as a key part of e-portfolio development. As the e-portfolio is intended to allow students to include evidence created outside of school, it is necessary to consider students' home use ICT, including divides that this may create, as is described in the next section.

3.6 Student Use of ICT

Student use of ICT is complex and students make use of ICT in different ways at home and at school (Furlong & Davies, 2012). School use of ICT may be seen as complementary to home use in developing students' technology skills (Bennett & Maton, 2010). This section discusses the literature relating to students' use of technology at home and at school, in particular how issues relating to the digital divide affect home and school use of ICT.

Student home use can be different from school use of ICT in terms of the control the student has over the type of activity they engage in and the time spent. In school, the teacher and other school structures such as timetabling control how students make use of ICT (Margaryan et al, 2011; Furlong & Davies, 2012). In addition, students are more likely to use ICT for social and communication activities at home than at school. Students identify that mobile phones are more popular than home computers for web

access (Kreutzer, 2009; Lenhart, 2010; Margaryan et al, 2011). This increase in student use of mobile phones is leading to some schools making use of students' personal devices within the school (Quillen, 2010).

Whilst the motivational effect on students is often identified as a significant benefit of the use of ICT (Passey, et al 2003), Eynon & Malmberg's (2011) study of young people's internet use found four types of user characterized by how much time they use the internet and what they use it for. These classifications were based on students' use of the internet for five different activities, communicating, information seeking, entertainment, participating and creativity and also contextual factors such as age, gender, attitude to ICT and parental control on internet access. Eynon & Malmberg (2011) found that, while some students made frequent use of the internet and were involved in creative practices, these students made up the smallest group as is indicative of the 'participation inequality' also identified by Hill et al (1992).

In addition, first and second level digital divides continue to exist and may be exacerbated by the use of ICT for homework tasks (Somekh, 2004; Iske, et al, 2008; Stevenson, 2008; van Braak & Kavadias, 2005). While the first-level digital divide considers whether there is access to ICT including the internet, the second-level digital divide is discussed in terms of the nature and quality of access and the range of activities undertaken whilst online (Warschauer, 2003b; DiMaggio et al, 2004). In this second-level digital divide, rather than a simple have or have-not distinction to internet use, consideration is also given to whether students have the abilities to find and interpret information (van Deursen & van Dijk, 2011). It is these skills of information retrieval and interpretation that are important for schools to develop, to alleviate divides that can occur (Kent & Facer, 2004; Eynon, 2010; Facer & Green, 2007).

It is important to avoid the assumption that all young people are 'digital natives' and, while there is some evidence for increased engagement through the use of ICT, it is not universal (Facer & Green, 2007; Selwyn, 2011a; Selwyn, 2012a). There are 'pockets of indifference' and a large number of students for whom technology is not a priority.

This study includes the views of the learner within the discussion of the use of ICT to support teaching and learning as is illustrated in the research design (chapter 4).

Schools have a role in developing digital literacies in all students in order to alleviate the digital divide between those who have and those who do not have access to communications technologies, in particular, the Internet (Brown & Czerniewicz, 2010; Hargittai, 2010; Van Dijk, 2006; OECD, 2002; Warschauer, 2003a; Gourova et al, 2001; Hague & Williamson, 2009; Tas, 2011; Hsu, 2011). The teaching of information literacy skills across the curriculum is required (Hague & Payton, 2010), as students might not develop these skills simply by having access to technology (Eynon, 2010; Facer & Green, 2007; Bennett & Maton, 2010).

This section has outlined issues relating to student use of ICT at home and at school. Many students make use of ICT outside of school, but not all students have access to ICT or may not choose to develop their skills. As discussed above, schools should develop students' digital literacy skills across the curriculum. Therefore, how students make use of ICT outside of school is relevant in terms of how schools plan and deliver this.

3.7 CONCLUSION

This chapter has presented literature relating to the use of ICT within secondary schools, considered reasons for the use of ICT and how different views of pedagogy and what constitutes good teaching affect the use of ICT. How students make use of ICT at home and at school has been discussed and it is noted that students' use of ICT is not homogeneous. Therefore it is necessary to investigate students' ICT use and their views within the school studied here considering the work of Eynon & Malmberg (2011) and Bennett & Maton (2011). This chapter continued by examining in more detail the use of VLEs and e-portfolios within education. The benefits identified of the use of e-portfolios for assessment will be investigated and evaluated in this study, whilst also noting the potential drawbacks discussed above.

With respect to the implications of the existing research, this study focuses on the following research questions:

- How is ICT used to support teaching and learning in practice, including how students, parents and teachers understand and negotiate their roles when using the VLE and e-portfolios

- To what extent is ICT use influenced by factors such as the students' 'digital literacies' and, in particular, the ways in which students access and use ICT in and out of school?

In my position as a teacher, these research questions are of interest in terms of how e-portfolios can be used to develop holistic assessment of students' ICT attainment at the end of Key Stage 3. E-portfolios will allow for recognition of ICT skills developed and used outside the ICT classroom in addition to gaining an understanding of students' views on their use of ICT. This study will investigate students' learning outside the classroom and the role of the VLE and e-portfolios whilst considering the impact for those students for who access to or use of computers is difficult.

The subsequent chapter describes the research process, starting with the methodology, research methods and of course, ethical issues raised and how they will be dealt with.

Chapter 4: Research Methods

4.1 Introduction

This chapter outlines the research strategy and, as the data gathering took place within my own institution, the role of the researcher in insider research is also considered. The chapter sets out the research design and research methods, describing the use of questionnaires, interviews, observations and use of documents including how these data were analyzed. The chapter concludes with a discussion of ethical considerations.

4.2 Methodology

With regard to the aims of the research to investigate the use of ICT within the school, the research was conducted following a case study approach (Stake, 1995; Adelman et al, 1980; Yin, 1984) in order to understand the research context in more detail. Such an approach is widely used within educational research (Hitchcock and Hughes, 1995; Bassey, 1999) and there are a number of examples of case study research within educational technology, e.g. 'SITES M2' (Kozma & Voogt, 2003), 'ImpaCT2' (Becta, 2001) and 'Impact of e-portfolios on learning' (Becta, 2007). A case study approach concerns the nature of a given instance in order to illustrate participants' thoughts, feelings and lived experiences (Stake, 1995; Adelman et al, 1980; Geertz, 1973). This is important here as this study is concerned with teachers' beliefs and experiences with using ICT in practice.

Case studies can be categorized by the outcomes of the study: an exploratory study can be considered as a pilot to other research; a descriptive case study is concerned with providing a narrative account; and an explanatory study is concerned with testing theory (Yin, 1984). These categories correspond with classifications of descriptive, interpretative and evaluative case studies (Merriam, 1988). This research followed a descriptive case study methodology, as it seeks to provide a narrative account of how second-order barriers affect the integration and use of ICT and how ICT is used in

practice, including the use of Virtual Learning Environment (VLE)-based e-portfolios in a given instance (Yin, 1984; Merriam, 1988).

In addition, a case study requires a number of features, in terms of the need for the case to be a functioning body and bounded system with the use of experiential knowledge that incorporates the influence of the social, political and contextual factors (Stake, 2005). Case study methodology has been used in research in educational settings to study and evaluate aspects of the curriculum or innovation, as is the aim of this research (Hitchcock & Hughes, 1995; Bassey, 1999). The central role of the researcher as a feature of a case study is of particular relevance to my role as a practitioner researcher within the research setting (Hitchcock and Hughes, 1995) and will be discussed further in section 4.9.

It is important to note the issue of generalizability, as the research carried out provides a specific account of one institution (Hammersley, 1992; Weiss, 1994). Consideration should be given to whether results are generalizable within (internal) or beyond (external) the setting of case study (Maxwell, 2005). Within a single case, as carried out here, it is important that results are generalizable within the setting of the case study as the descriptive, interpretative and theoretical validity of conclusions depend on this (Maxwell, 2005). Internal generalization was considered here in terms of ensuring representativeness of the sample within the case study. In addition, Lincoln & Guba's (1985) guidelines for trustworthiness were also considered here. This includes increasing credibility of the research through triangulation (described further in section 4.8), ensuring overlap of methods, providing thick description of the case and allowing for 'member checks' of the analysis and data collected.

External generalization can be related to theory generation and therefore case study research may be of value in clarification of theory (Evers & Wu, 2006). However, if the chosen case is of interest for its specific features the theory generated can still be extended to other cases (Silverman, 2005; Thomas, 2011). The case here is chosen due to the specific features of its ICT provision, described in chapter 1 and therefore results here may be generalizable in similar settings (Adelman et al, 1980).

From this discussion, it can be seen that a descriptive case study approach fulfils the aims of the research, answers the research questions, and provides recommendations with regard to the use of ICT within the school.

4.3 RESEARCH DESIGN

This section outlines the phases of the study and the methods used within these phases. A mixed method approach has been used with consideration of triangulation of data. As is described by Johnson et al (2007), Creswell & Plano-Clark (2011) and Creswell (2013), mixed-method approaches allow for combining the strengths of qualitative and quantitative methods to develop stronger breadth and depth of understanding. Here an 'explanatory sequential mixed-methods' approach (Creswell & Plano-Clark, 2011; Creswell, 2013) was followed. Quantitative data was collected to identify factors and relationships, followed by the collection of qualitative data to gain further insight into these relationships and provide explanatory detail. A cyclic process for data collection and analysis was used (Hitchcock & Hughes, 1995) in order to allow for analysis of data to inform the next period of data collection.

Data collection took place within four phases spread across two academic years with reference to Kemmis and McTaggart (1988), as outlined in the research timeline shown in table 5 below. This allowed for analysis of data collected at each phase to inform the data collection in subsequent phases.

Phase	Approximate timing	Description
Preliminary	June 2010	Collection of background information Development of project plan and research design Development of research tools
Phase 1	September 2010	Student questionnaire identifying initial attitudes to current use of VLE and ICT activities across the curriculum both during and beyond the school day.
	October 2010	VLE log data collected
	November 2010	Data analysis of questionnaire; identified students for interview and interviews carried out. Observation of discrete ICT lessons focusing on introduction to portfolios and initial creation
	December 2010	Analysis of phase 1 data
Phase 2	February 2011	Second student questionnaire identifying attitudes to developing use of e-portfolios. VLE log data collected
	March 2011	Analysis of second student questionnaire Second interview of students identified in data collection phase 1
	June 2011	Second observations of ICT lessons focusing on e-portfolio preparation and maintenance. Analysis of phase 2 data
Phase 3	July 2011	VLE log data collected and collated VLE log data analyzed e-portfolio data collected and analyzed
	October 2011	Third student questionnaire identifying attitudes to the established use of VLE and use of e-portfolios. First staff questionnaire, identifying attitudes to use of VLE and other technologies.
	November 2011	Lesson planning data collected.
	January 2012	Parent questionnaire identifying attitudes to use of VLE and other technologies.
	February 2012	Analysis of phase 3 data
Phase 4	April 2012	Second staff questionnaire, identifying use of and attitudes to ICT.
	June 2012	Analysis of questionnaire identified staff for interview and interviews conducted. Observation of non-ICT lessons focusing on use of technology
	September 2012	Analysis of phase 4 data

Table 5: Research timeline

As can be seen in table 5 above, data were collected using questionnaires, interviews, observations and naturally occurring data such as lesson plans, VLE logs and e-portfolios created. The following sections will describe in more detail the methods used and how these data were analyzed.

In addition, as noted earlier, triangulation can be achieved using various methods (Bryman, 2001; Elliot & Adelman, 1976), whilst being mindful of 'naive efforts at triangulation' whereby multiple sources or methods are used without adequate reasoning (Coffey & Atkinson, 1996). Triangulation can also be achieved through variety of data analysis (Coffey & Atkinson, 1996). Within this piece of research, triangulation between methods has been considered in order to provide the level of internal validity required, as described further in section 4.8.

As described above, data has been collected through questionnaire, interview, observation and document evidence. Each of these methods is described in more detail, including how these methods were combined within the study.

4.4 Data Collection – Questionnaires

Questionnaires were used to gather data within all phases of the research with student, teacher, and parent respondents recruited in order to identify attitudes to and use of the VLE and other technologies. Questionnaire responses were later used to identify a sub sample of respondents for interview. A number of common questions were included for comparison between student and staff views of ICT use, including attitudes to the frequency and purpose of use of technology. In order to ensure the validity and reliability of the findings of the questionnaires a number of aspects were considered, including the use of previously tested questions in the preparation of the questionnaire and the practice of piloting these questionnaires. This section will discuss the design and analysis of questionnaires for students, teachers and parents.

4.4.1 Student Questionnaires

Questionnaire data from students were collected using online questionnaire tools available through the VLE. The advantages and disadvantages of e-survey methods, in terms of validity, reliability and bias within the research, include the strengths of e-surveys in taking advantage of users' familiarity with the method of completion, relatively low cost of administration, and ability reach a large number of respondents (Jansen et al, 2007). However, there are issues relating to sampling whereby respondents, by default, are those who have access to and are familiar with the technology, as is the case within this piece of research (Jansen et al, 2007). Students were given time within their ICT lessons to complete the questionnaires to alleviate this.

The sample size for the questionnaire is fixed at the size of the Year 9 cohort; two hundred and two students at the start of the study, and therefore the whole cohort were invited to take part in this section of data gathering with an average response rate for these questionnaires of seventy-five percent. In order to mitigate self-selection bias often inherent in web based surveys (Sue & Ritter, 20112; Fan & Yan, 2010; Sills & Song, 2002); students were given time during the school day to complete the surveys, and demographics were used to ensure that the respondents were representative of the cohort as a whole. Facilities of the VLE delivery method meant that it was not possible for students to take the questionnaire more than once.

In terms of demographics; the year group as whole has 46% female students and 54% male; responses to the questionnaires had 47% from female students and 53% from male. The questionnaire responses were also representative of students with Special Educational Needs (SEN) and students entitled to free school meals (FSM). The year group as a whole has 15% of students with SEN and 5% of students eligible for free school meals; response rates to the questionnaires had 17% had SEN and 4% were eligible for FSM. The year group is divided into eight tutor groups, approximately equal sized therefore with 14% of the year group in each tutor group. The percentage respondents by tutor group ranging from 12.2% to 15.9%. This is important here, as

tutor groups are used as teaching groups in a number of subjects, including ICT and therefore can be used to investigate variation between classes within a single department. As noted previously, the school has low numbers of students from ethnic minorities or students for whom English is an additional language (EAL) and these students were included within the research cohort. Language support was offered to students for whom English is an additional language, but was not required. The sample, and how this was represented within the interview cohort, is described further below in table 6

Category		**Sample Response Rate %**	**Interview Cohort**
Gender	Female	47	4
	Male	53	4
Tutor Group	1	17.4	1
	2	12	1
	3	14.4	1
	4	13.2	1
	5	14.4	2
	6	15	1
	7	13.8	1
Attitude to ICT	Positive	43	3
	Mixed	47	3
	Negative	10	2
Home internet access	Yes	96.1	7
	No	3.9	1
Ability	High	36.4	2
	Medium	42.1	4
	Low	21.5	2

Table 6: Sample response rate and interview cohort for students

The student questionnaires (appendix B) made use of a variety of previously used questionnaires (Fraser, 1981; Zandvliet & Fraser 2004; Becta, 2007; Livingstone & Bober, 2004) in order to enhance the validity and reliability of results by using questions that have been thoroughly tested. Questions from Test of Science Related Attitudes (TOSRA) (Fraser 1981) and other versions such as Test of Maths Related Attitudes (Zandvliet & Fraser, 2004) were adapted to focus on ICT. The 'What is happening in this class?' questionnaire (Zandvliet & Fraser, 2004), which makes use of

a number of additional factors in terms of student views on their learning in ICT, were used to establish attitudes to ICT and to investigate students' views of their ICT based learning in and out of school. In establishing attitudes to the VLE and e-portfolios, use was made of Becta's questionnaire from the Impact Study of e-portfolios on learning (2007). Finally, in order to establish students' home technology access and usage, questions have been adapted from UK Children Go Online survey (Livingstone & Bober, 2004) – in order to recognize advances in technology since the development of their study.

While informed consent is also described in section 4.10, it is noted here that consent was obtained from both the students and their parents, due to the age of the children involved, prior to the first period of data collection.

In terms of validity and reliability of questionnaire design, problems of non-response and accuracy from respondents were considered (Belson, 1986). In order to minimize these issues, student participants were given time within the school day to respond, in addition to making the questionnaire available online. In terms of accuracy from respondents, care was taken with the use of language, avoiding leading questions, use of double negatives and avoiding open-ended questions. The questionnaire was piloted online with older (Y12/13 A Level ICT students) in order to improve reliability, validity and practicability (Litaker, 2003). This resulted in some wording changes to improve clarity.

In considering the reliability and validity of the data collected, it is recognized that technology use is fluid (Collis & Moonen, 2001) and that information gathered through the questionnaires is only valid for a limited time (Muijs, 2004). Consequently, this was taken into account, through the repetition of similar questions throughout the study and the use of other research methods to enable triangulation (Hitchcock & Hughes, 1995). In terms of issues with validity of online questionnaires such as respondents taking the questionnaire multiple times and therefore affecting results and anonymity allowing potentially anyone online to take the survey, these issues are addressed by using the VLE to host the questionnaire (Jansen, et al, 2007). This

ensures that, through the requirement of a username and password, only invited respondents can take part and provides facilities to ensure that each respondent can only provide one set of results.

When considering the reliability of both quantitative and qualitative data it may be the case that reliability should be seen as matter of degree rather than an absolute state as research can never be 100 per cent reliable (Gronlund, 1981; Joppe, 2000; Golafshani, 2003; Lincoln & Guba, 1985). With respect to questionnaire data, reliability can be expressed through the internal consistency of the survey instrument using Cronbach's alpha as a measurement of scale data and it is important for the researcher to identify consistency and accuracy of research methods used (Golofshani, 2003). In the questionnaires undertaken as part of this research, using Cronbach's alpha measurement of the internal consistency of scale data, it was found that these questions measured above the desired 0.7 value, as intended by making use of previously tested questionnaire designs as described above.

4.4.2 Teacher Questionnaires

Questionnaires for staff within the school also made use of online survey tools available through the VLE. Again, in order to enhance validity, use was made of Becta publications (2010b) concerning teaching and learning with ICT and the questionnaires can be found in appendix C. The purpose of the questionnaires was to investigate reasons for the variation in ICT use identified through analysis of student questionnaire data. In particular, teachers beliefs were investigated about the efficacy of ICT, their confidence and competence with ICT and their views on leadership and Continuing Professional Development (CPD), as identified through literature (Kopcha, 2012; Wachira & Keegwe, 2011; Rezaei et al, 2011). First-order barriers (Ertmer, 1999) were not anticipated to impact on practice here and questions were also included to confirm this view.

In terms of sampling, all staff were invited to participate, in order to elicit responses from support staff, such as teaching assistants, who, through their work within many classrooms across the school, may have different opinions to other staff (Anderson,

2011). As some questions did not apply to support staff, analysis of the questionnaires was conducted using the full set of responses and the subset of teaching staff as appropriate. The response rates here are 70% for teaching staff and 75% for all staff, including support staff. Table 7, below, summarizes the response rates describing the sample achieved and the number of interviewees in different categories including both teacher and SLT interviews.

Category		**Sample Response Rate %**	**Interview Cohort**
Role	Teacher	39.7	7
	Middle Leader	27.9	7
	SLT	5.9	5
	Other	26.5	1
Gender	Female	60	11
	Male	40	9
Length of Service	NQT	4	2
	2-5 years	22	1
	6-10 years	26	3
	11-15 years	22	7
	16+ years	22	7
Subject Groupings	Art & Design Technology	12	2
	Business Studies, PSHE, RE & Sociology	10	3
	English & MFL	20	4
	Geography & History	10	1
	ICT	8	2
	Maths	10	2
	Music, Dance, Drama & PE	6	2
	SEN	6	2
	Science	16	2

Table 7: Sample response rate and interview cohort for staff

As described above, to enhance validity questionnaires were piloted with senior members of staff. As all staff have a laptop provided by the school and many have desktop computers in their offices in school, it was expected that the use of e-survey methods would not present problems as identified above.

4.3.3 Parent Questionnaire

While teachers and students have access to technology at school, making online questionnaires more accessible, it was felt that parents may not have sufficient access and providing an email based invitation to take an online questionnaire would require the acquisition of parental email addresses. This may raise the issue of data protection and not all parents may have an email address. In view of this, the parental questionnaire was administered using a paper-based method and all parents of the student research cohort were invited to participate. Here, the response rate was low, with only 30% of parents completing a questionnaire.

The questionnaire can be found in appendix D. The data gathered from parents was designed to support that from students in terms of home access and the involvement of parents in the use of education technology. In response to findings in terms of VLE log data analysis (described in section 4.7.2), teacher and student interview and questionnaire responses, the parental questionnaire was designed to investigate parent use of ICT with their child and without their child at home.

4.4.4 Data Analysis

Questionnaire results were analyzed using SPSS, to produce descriptive statistics and identify significant factors using chi-square tests (Miller et al, 2002). Quantitative data was analyzed in order to explore the following themes, which were derived from the research questions:

- Differences in home and school use of ICT
- Lack of use of the VLE
- Variation in ICT use at school both within and between subjects

These themes were then used to inform subsequent student questionnaires and interviews and teacher questionnaires.

Analysis of teacher questionnaire data also made use of SPSS, as stated above. This analysis identified further themes:

- Variation in how ICT is used
- Variation in attitudes to ICT, confidence with ICT, attitudes to CPD and leadership

These themes were followed up in interviews; lesson observations and lesson plan analysis (described in section 4.7.1), in order to develop understanding and triangulation of data.

In order to support VLE log data findings, analysis of parent questionnaire data showed that parent use of technology is low. However, the poor response rate of this questionnaire was noted (Bryman, 2001).

4.5 Data Collection – Interviews

From the analysis of student questionnaire data, two groups of students were identified to take part in follow up group interviews; this sample of students was identified through analysis of initial questionnaire data with students selected based on themes that emerged. Students were identified based on pre-selected criteria of gender, ICT group, access to technology outside of school, attitude to ICT and the VLE. This approach was used, as case studies often involve small populations and this method of sampling is considered appropriate in investigating the case by selecting information-rich respondents to develop better understanding of the case (Stake, 2005). This entailed ensuring that the group represented a mixed view of ICT and the VLE, how the students made use of ICT at home and were representative of the year group as a whole.

4.5.1 Student Group Interviews

Initially a sample of ten Year 9 students was identified. Students were interviewed in small groups of up to four (Hopkins, 2002), depending on attendance of the selected cohort as some students were absent or did not want to take part within the interviews reducing the sample to eight students. Each group of four students contained a mix of gender, ability, tutor group and attitudes to ICT, as shown below in table 8 below. Tutor group and ability were included in order to look for differences within classes as subjects are taught either in sets based on ability (e.g. English, mathematics, and science) or mixed ability tutor groups (e.g. ICT, DT, history, geography etc.).

Student	Gender	Ability	Tutor Group	Attitude to ICT
Group 1				
A	Female	High	6	Positive
B	Female	High	2	Negative
C	Male	Medium	7	Positive
D	Male	Medium	1	Mixed
Group 2				
E	Female	Medium	4	Mixed
F	Male	Low	5	Positive
G	Male	Low	3	Mixed
H	Female	Medium	5	Negative

Table 8: Student interview cohort demographics

As can be seen in appendix E the interview covered and expanded on the themes explored through the questionnaires. This included how the students viewed and made use of ICT, including the VLE, at home and at school, and investigating differences. In order to enhance accuracy, an audio recording of the interviews was also produced.

4.5.2 Senior Leadership Team and Teacher Interviews

After questionnaires were completed a representative sample of fifteen staff members was identified for interview. The sample contained members of teaching staff with varying experience in teaching, expertise in ICT, attitudes to the use of ICT,

responsibility within the school and gender as shown below in table 9. The subjects represented include Art, business studies, English, geography, ICT, mathematics, Modern Foreign Languages (MFL), music, RE, PE, SEN and science.

Teacher	Experience in Teaching	Expertise in ICT	Attitude to the use of ICT	Responsibility	Gender
A	8 years	Medium	Positive	AST	Female
B	24 years	Low	Accepting	Class teacher	Female
C	12 years	Low	Positive	Unqualified teacher / TA	Female
D	14 years	Low-medium	Positive	Class teacher	Male
E	28 years	Low	Negative	Class teacher	Male
F	16 years	Medium-high	Strongly Positive	Class teacher	Female
G	11 years	High	Strongly Positive	Middle leader	Male
H	7 years	High	Positive	Middle leader	Male
J	12 years	Medium	Positive	Middle leader	Male
K	12 years	Low	Negative / Accepting	Middle leader	Female
L	12 years	Medium	Negative / Accepting	Middle leader	Male
M	20 years	Low	Strongly Positive	Middle leader	Female
N	NQT	High	Strongly Positive	Class teacher	Female
P	NQT	Medium	Positive	Class teacher	Female
Q	4 years	Low-Medium	Accepting	Class teacher	Female

Table 9: Teacher interview cohort demographics

Five members of the senior leadership team (SLT) were also interviewed. Interviews were conducted with each member of staff individually. The staff interviews were semi-structured and the content of these interviews, as can be seen in appendix F, served to illuminate further the questionnaire responses, identifying how and why staff made use of technology within the school. Similarly, SLT interviews were also semi-structured in nature and focused on articulating the SLT vision for ICT within the school and how they viewed current practice (appendix G).

Semi-structured interviews allow the researcher to combine elements from informal and standardized interview structures with the aim of minimising the weaknesses inherent in both (Bogdan & Biklen, 1992; Patton, 1980). Interview questions, wording and sequence can be planned but questions that emerge from the respondents' own answers can be included, which allows for more flexibility than standardized interviews while also ensuring that required questions are always included.

Informed consent was sought from all research participants and audio recordings taken where permission was given. Permission for audio recording was not given for one interview. In terms of validation, all respondents were given a copy of the interview transcript to check for accuracy. Some small changes were made as a result of this respondent validation.

4.5.3 Data Analysis

Miles & Huberman (1984) describe three phases of analysis of qualitative data, that of *data reduction, data display* and *conclusion drawing / verification*. These three stages may be viewed as interrelated rather being a sequential set of steps as show in the diagram (figure 4) below.

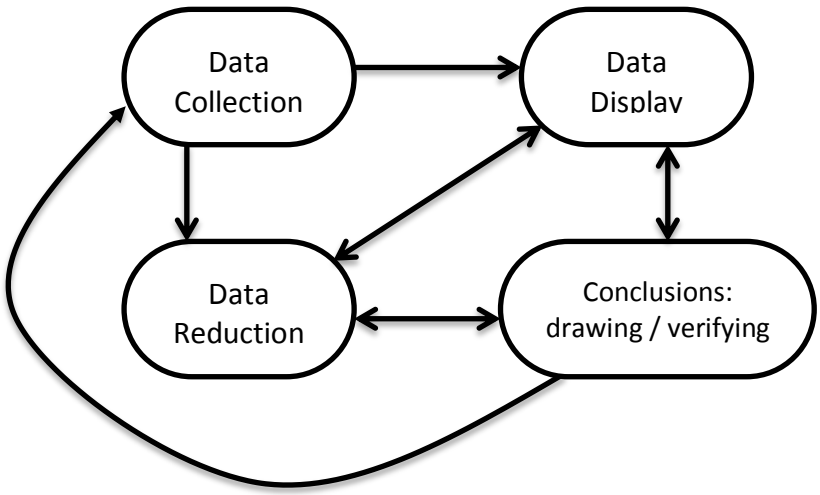


Figure 4: Components of data analysis (Miles & Huberman, 1984, p12).

Data reduction is defined as the organization; simplification and summarising of data where codes are developed and analytical themes can be identified (Miles & Huberman, 1994; Berkowitz, 1997; Berg, 2001). Data display refers to the ways of arranging, organizing and compressing data further to allow conclusions to be drawn and assist understanding, where high-order categories may be identified (Miles & Huberman, 1994; Berkowitz, 1997; Berg, 2001). Miles & Huberman (1994), Berkowitz (1997) and Berg (2001) go on to clarify the stage of drawing and verifying conclusions as identifying what the analyzed data mean in terms of implications for the research questions and verifying these conclusions through revisiting the data and through

identifying clearly the process used. The process provides a method of managing and presenting data that does not "destroy meaning through intensive coding" (Eisenhardt, 2002, p8).

Also, as has been already noted, respondent validation of accounts of interviews and observations was sought, with the students involved in the interviews and the teachers observed provided with an account of their participation in order to provide confirmation of the accuracy. In addition, 'member checks' (Lincoln & Guba, 1985) were undertaken both through respondent validation of interview transcripts and through discussion of emerging themes with a number of members of staff to ensure that the interpretation of the data was accurate.

Interview data was analyzed thematically, identifying and applying codes and themes from within the data as well as a priori codes in terms of specific uses of ICT, leadership, support, and CPD as a result of analysis of questionnaire and lesson planning data, discussed further below in section 4.7.1. Initial analysis focused on themes of change through the use of technology, as shown below in figure 5.

Pedagogical Change	Social Change	Policy/Institutional Change	Technological Change	Leadership & Support and CPD
Pedagogy – variance across subjects. Art, English, ICT, Music & SEN – enhancing learning, focus on student use. DT, Drama, PSHE – balance more towards teacher use but include some focus on students. Business, Media, Health and Social Care, Maths, MFL, Sociology – all use to support teaching	Majority of students have access to a computer outside of school and make use of it for homework. However, this is not the case for all students and students may have more than one home with access varying between locations. A small number of students have only mobile access, commented on by some students that this is their preferred method of internet access	Staff identify culture of school in terms of expectation that ICT will be used, especially IWB due its prominence within each room and lack of alternative method of presentation. Evidence that IWB is mainly used for presentation. Some staff are critical of perception of IWB as facilitating interaction as only a small number of students can use it at once but almost all staff highlight use to include audio and video in presentations.	Appearance and user interface of the VLE and e-portfolios is important in terms of use. Students do not like the interface for the e-portfolio software and wanted something they could customise more	Some statistical differences in terms of role (SLT, TLR, no responsibility): contributing to school's self-review of technology use; access to hardware and software
Pedagogy - emphasis on use to support teaching; some focus on ICT to support learning in some departments.	Use of IT outside of school is varied; emphasis is on social communication, research and homework. Gendered differences only apparent in gaming where more boys use	Pedagogy - school focus on TEEP guides use of technology.		Majority feel that there is a lack of leadership and training in terms of pedagogy

Figure 5: Initial codes and themes within data analysis

Data from open questions in questionnaires and from observations were included in the analysis and further codes and themes developed. Use was made of a bespoke database, created in Access, to analyze the data. The resulting codes are shown in table 10, below.

Theme	Codes
How ICT is Used	VLE use Mobile/Smart Devices Supporting Teaching Promoting Learning Presenting Information to students Using IWB Enabling / facilitating feedback and collaboration Administrative tasks (planning, marking and assessment) Communication with staff and parents Differentiation Student home use of ICT
VLE and e-portfolios	Importance of user interface Functionality of VLE – how VLE is used. Functionality of e-portfolios Alternatives to using the VLE Why VLE is used Students' selection of work to be included in e-portfolios 'best work' Parental engagement with ICT
TEEP	Understanding of 'effective use of ICT' Importance of TEEP to structure lesson planning Imaginative and creative use of ICT
Reasons for use and non-use of ICT	Leadership / management of ICT Motivational effect of ICT use for students Policy and external pressures on how ICT is used. Training / CPD Power / control Teachers' time

Table 10: Codes generated in data analysis

4.6 DATA COLLECTION – OBSERVATIONS

Observations were conducted in order to support findings from questionnaires and interviews in the way that ICT is used across the curriculum and also to understand how students construct their e-portfolios within discrete ICT lessons. The approach to both these sets of observations is described below, followed by a description of data analysis.

4.6.1 ICT Lesson Observations

In order to gather data relating to the roles of the teacher and student in e-portfolio creation, a number of discrete ICT lessons were observed. As has previously been noted, the introduction and use of e-portfolios was a new concept for the institution

and even now is not a widely used technique in Key Stage 3 secondary education. Therefore, the Year 9 ICT teaching team jointly planned the mode of delivery. Observations were semi-structured and recorded the roles of the teacher and student with respect to the creation of e-portfolios while providing a rich description of the environment and contexts, in order to develop the case study (Cohen et al, 2004; LeCompte & Preissle, 1993). Data collected during these observations was designed to support that of data collected through interview and questionnaires, allowing for triangulation of data sources.

Again, a pilot observation schedule was undertaken in order to increase the validity and reliability of its findings within the research, both in terms of how the observations would take place and how I would avoid bias during the observation, and ensure I could view a familiar situation objectively. While being mindful of observer effects, the school encourages a culture of coaching that is fully supported by the ICT department and therefore it is commonplace for there to be more than one teacher present during the lesson.

However, as noted, it was important to manage the observations in a neutral way and allow myself, as researcher, to view the e-portfolio construction lessons as 'strange' despite being involved at a planning and delivery level in my role as teacher. In order to 'make the familiar strange' here I looked on the construction as someone unfamiliar with the concept would do and recorded the observation of what was actually taking place in the lesson, attempting to disregard knowledge I had of what should be taking place or why it was taking place. For example, taking part in the activity, discussing the process with students and asking them to describe and explain their actions.

4.6.2 Lesson Observations – ICT Use Across the Curriculum

Observations were also conducted across the school, focusing on the use of technology in other subjects. The observations made use of lesson observation techniques from my professional practice and followed a 'learning walk' (Hill & Mann, 2005; DfES, 2007; Fisher & Frey, 2014) format. A 'learning walk' entails the observation of a number of classrooms within one lesson period across the school and

is undertaken with other members of staff. Here, senior and middle leaders accompanied me on these observations, in order to increase the accuracy of observation judgments. The format of the 'learning walks' involve spending approximately 10 minutes in each classroom, with time spent between observations discussing and combining judgments. Within the classroom, the observations followed a semi-structured format (Cohen et al, 2000), and made use of Starkey's (2011) digital learning matrix in order to evaluate the use of ICT to support teaching and learning, shown in the observation schedule in appendix H. Observation notes were recorded based on themes and categories identified from literature (Starkey, 2011) and data analysis concerning the use of ICT within the lesson and, for example, whether this was teacher or student-led. Where appropriate, depending on the lesson content, the use of ICT was discussed with students and their comments also recorded. In addition, after the lesson, the observation was discussed with the class teacher, and their views of their planned ICT use considered within the observation notes.

Eleven lessons were observed across a number of subjects and year groups, as shown in table 11 below.

Observation	**Year Group**	**Subject**
A	Y10	Science
B	Y10	Business Studies
C	Y8	Geography
D	Y8	English
E	Y10	DT
F	Y8	English
G	Y8	Art
H	Y9	Science
I	Y7	ICT
J	Y9	Mathematics
K	Y8	ICT

Table 11: Learning walk observations

These learning walks were conducted at three different periods within the timetable and at different times in the school year. Lessons observed covered a wide range of subjects and included technology use in dedicated ICT rooms and also the use of laptops and mobile devices in, for example, science and geography classrooms. These

observations also provided triangulation of data in terms of supporting findings from questionnaires and interviews, from both staff and students. As mentioned above, these observations were conducted with a senior member of staff in order to moderate observations made.

4.6.3 Data Analysis

As described above in section 4.5.3, data collected within observations of ICT lessons on e-portfolio development was analyzed alongside interview data. This identified themes within e-portfolio development including how students chose what to include within their e-portfolios and difficulties associated with the technology. This then informed the analysis of the e-portfolios created, as described below in section 4.7.3.

In terms of the analysis of observations of the use of ICT across the curriculum, this data was analyzed with respect to the findings of questionnaires and lesson plan analysis in terms of how ICT is used. As a result of analysis of interviews, these lesson observations were then analyzed in terms of connection with the ICT department, as shown in chapter 6.

4.7 Naturally Occurring Data Sets

The collection and analysis of documents often forms part of a case study (Hopkins, 2002; Lankshear & Knobel, 2004; Bryman, 2001; Hitchcock & Hughes, 1995; Yin, 1984). Here, documents collected and analyzed include lesson plans from the institution, VLE log data and e-portfolios created by students. These are considered to be naturally occurring data, as these data would have been generated normally within the institution, whereas interview, questionnaire and observation data described above would not. These naturally occurring data were collected to provide triangulation between data and documents routinely produced within the institution and data generated by the study. These data allow for the regular practice of the institution to be strategically used to inform the study. This section includes a description of how these data were obtained and analyzed (Lankshear & Knobel, 2004).

4.7.1 Lesson Plans

To support observational data, and with the view of improving validity through triangulation, lesson plans were collected and analyzed in terms of ICT-based activities. This data was collected to support questionnaire, interview and observation data with teachers in order to identify how teachers plan to use ICT to support teaching and learning.

In order to preserve anonymity, a senior member of staff assisted with the collection and collation of these lesson plans, anonymising individual teachers but identifying departments. The sample was collected for one day, where staff provided one lesson plan as representative of their best practice. The sample included fifty lesson plans representing art, business studies, creative media, drama, DT, English, health and social care, history, ICT, maths, Modern Foreign Languages (MFL), music, PE, PSHE, science, sociology, and SEN departments.

In terms of data analysis, ICT based activities were identified within the lesson plans and divided into teacher and student uses, as shown below in figure 6.

Subject	Teacher use of ICT	Student use of ICT
Art	Timed activities through http://www.online-stopwatch.com/ Music, to prompt and identify the differentiation through ROLE activities (MP3 Files) http://www.youtube.com/watch?v=yrK0rZj6pes&feature=fvst	Activ Inspire to promote pace, e.g. quickest answer = 5 learning points
Business studies	**Berlin Wall collapse – you tube clip** **BBC Iplayer – South america – Chilean wine – how a free market has allowed Chile to become 5th biggest wine producer** **BMW cars – Picture on IWB – question How can Germany keep the price of a BMW at £20,000?**	
Creative media	Cartoon featuring Qualitative Vs Quantitative **Explicitly share Learning Objectives on IWB** PPT Presentation on Research Methods and Techniques	

Figure 6: Initial analysis of lesson plans

Using this data, uses of technology were identified and grouped, as shown below in figure 7. These uses of technology were grouped in terms of activities identified within the lesson plans and with reference to the types of activities considered within the teacher questionnaires (Becta, 2010b). The codes developed here were used to inform the development of codes used to analyze interview and observation data.

Science	Random Activity Generator Use of IWB / PPT to transmit information Use of IWB / PPT to transmit information Use of IWB / PPT to transmit information Use of IWB / PPT to transmit information Timer tools Timer tools Timer tools Timer tools Use of spreadsheet to track pupil progress Imagery/Video/Music to engage/transmit information	WWW tutorials
SEN	Imagery/Video/Music to engage/transmit information Use of IWB / PPT to transmit information	Learning Games Student use of IWB Using Powerpoint
Sociology	Imagery/Video/Music to engage/transmit information Use of IWB / PPT to transmit information Timer tools	

Figure 7: Analysis of lesson plans

Using this analysis, descriptive statistics were produced in terms of planned student and teacher uses of technology and are presented in chapter 6. Variance between departments was also analyzed, considering whether departments planned more teacher or student-led uses of ICT.

4.7.2 VLE Usage Statistics

As described earlier, other digital data was collected including VLE usage statistics and the digital e-portfolios themselves. A feature of Moodle, the VLE provider used within the school discussed previously in chapter 3, is its comprehensive log data of actions performed (Rice, 2006). Due to the volume of log data produced, three separate weeks of logs from different terms within the school year were downloaded and analyzed in order to provide a representative sample. The three weeks selected were in terms 1, 3 and 6 representing different times within the school year and therefore reducing the effect of data anomalies. In terms of variation across the academic year, actions performed within the sample from the first term accounted for approximately 46% with the 28% of actions taking place in the third term and the remaining 26% in term 6. It is important to note here that this log data merely provides statistics and other data collection methods must be employed to analyze meaning (Bryman, 2001).

In total 17730 separate actions were performed, not including internal error messages generated by the software that were removed from the data. This log data gives detail about the action being performed, the current time, the user's login details and IP

address and the section of the VLE in use. Descriptive statistics were therefore produced to show how the VLE is used on a routine basis in terms of type of activity undertaken, subject represented, who undertakes the activities and the time of day actions occurred and this data is presented in chapter 6.

This VLE log data was collected to support data from questionnaires, interviews and observations in terms of when and how the VLE is used. Interviews with students and staff followed up on this in order to explain patterns of VLE use identified through analysis of this log data.

4.7.3 E-portfolios

The e-portfolios produced by students as part of this research were analyzed in terms of their contents; this was followed up by questionnaire and interviews with students. In total 114 e-portfolios were collected and analyzed. This represented all the e-portfolios successfully created by students within the year group. This data was collected in order to investigate how students made use of the e-portfolio software; what evidence they selected for inclusion and where this evidence was created.

This analysis identified the quantity and nature of the attachments within the e-portfolios, focussing on file types and when and where the content was produced. This analysis made use of the codes identified from the lesson plan analysis described above, in terms of how teachers expect students to use ICT. However, due to the nature of the technology, some issues were encountered in terms of identifying web-based attachments and this failure is analyzed further within the results section 6.4.2. Descriptive statistics were produced identifying what kinds of documents were included in each e-portfolio, the number of attachments in each e-portfolio and which subjects the evidence represented.

The results of this analysis were used to inform observations of ICT lessons focusing on e-portfolio development, described above in section 4.6.1, and questionnaire and interviews with students about their e-portfolios in order to understand students' reasoning when creating them.

4.8 TRIANGULATION

As indicated above, triangulation is important in order to reduce bias and to ensure trustworthiness of the research findings (Lincoln & Guba, 1985; Bryman, 2001). Figure 8, below, shows how triangulation of data was undertaken here.

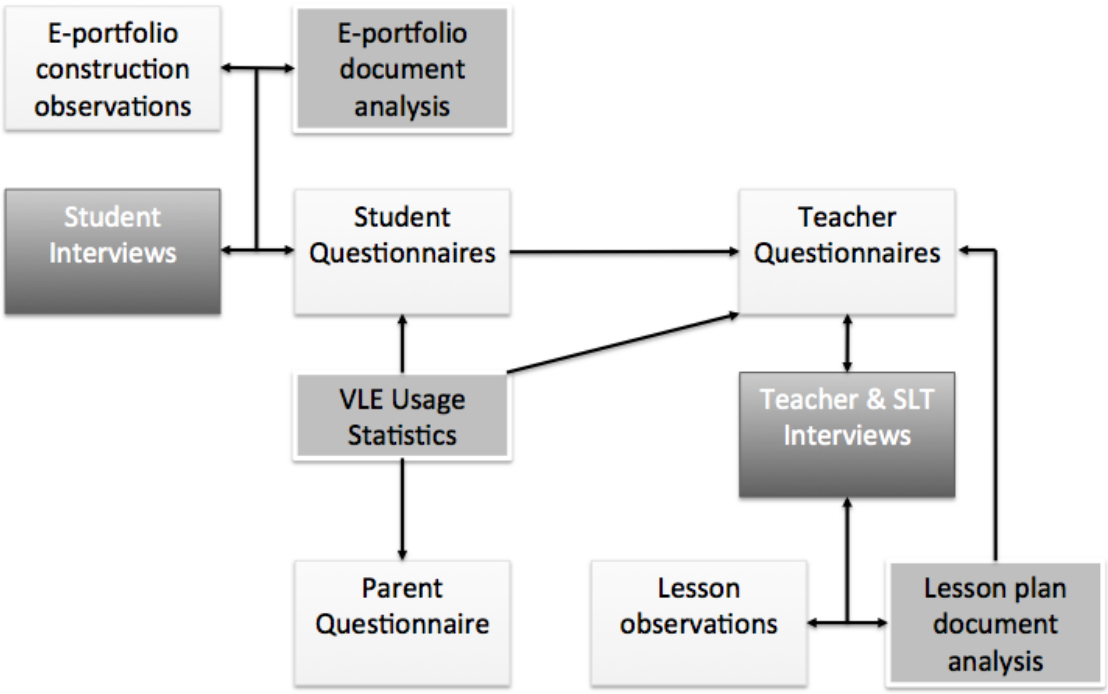


Figure 8: Triangulation of data

Figure 8 shows how data was linked to the research themes where student, teacher, and SLT interviews were used to investigate primarily how second-order barriers affect the integration and use of ICT and e-portfolio document analysis, lesson plan document analysis and VLE usage statistics were used primarily to investigate how ICT is used. The remaining data collection methods were used to support both clusters of research questions.

Themes emerging from analysis of student questionnaire were cross-checked with data from e-portfolio document analysis, student interviews, VLE usage statistics, and teacher questionnaires as appropriate. Similarly, themes identified through analysis of teacher questionnaire data were checked with data from teacher and SLT interviews, lesson observations and lesson plan document analysis. Results of the lesson plan document analysis are presented in chapter 6 and were supported by data collected

through student questionnaires, teacher questionnaires and lesson observations. VLE usage statistics were used in conjunction with student, teacher and parent questionnaires to identify patterns of use, with student and teacher interviews adding context to these findings.

4.9 INSIDER RESEARCH

As noted above, conducting research within one's own institution raises a number of issues, particularly with respect to validity, and this section examines these issues, including considering how they were dealt with.

While a positivist approach to research suggests that a researcher should be objective if results are to be considered reliable and valid (Rosenberg, 2012; Bryman, 2001) a number of authors note that no research can ever be fully objective (Rooney, 2005; Brannick & Coghlan, 2007; Drake, 2010; Mercer, 2007; Rabbitt, 2003). These sources also discuss how insider research can be of benefit while being mindful of the issues it raises. Researchers draw on their own social, cultural and historical background and it is important to be aware of this and work towards minimising bias (Rooney, 2005; Brannick & Coghlan, 2007).

Insider researchers may have a shared knowledge of the workplace that can enhance the research; in terms of the identification of the research sample and in analysing the data with the respect to the institution studied (Rooney, 2005). However, interviewing colleagues can be considered a 'social minefield' (Drake, 2010). This is due to the researcher's status within the organization; how they are viewed by colleagues and how this can affect the data gathered. In addition, the insider researcher will continue to work in the institution after the results are published and this requirement to 'live with the consequences' may affect how the results are reported or even what questions can be asked (Drake, 2010). Insider research may have advantages including easier access to the research setting and participants and that the insider's role within the organization can allow them to blend in, therefore reducing their effect of altering the research setting (Mercer, 2007). These issues relating to insider research, and my response to them are described below in table 12.

Issue	Explanation
Subjectivity	It is recognized that the research may make assumptions based on their own knowledge and experience and may struggle to 'make the familiar strange'. Therefore following guidance from (Delamont, 2002; Greene, 2014; Van Heugten, 2004), this was addressed through, for example, studying 'different' classrooms, including SEN and non-traditional GCSE pathways such as Work Related Learning. Within interviews it was important to make my position as researcher clear and ensure that interviewees clarify any 'deferring responses' (Chavez, 2008).
Bias	As is described by Greene (2014) and Van Heugten (2004), it is important to identify and mitigate bias. Therefore I was careful to avoid discussing my own opinions with colleagues throughout the research in order not to influence their responses. Following Lincoln & Guba (1985) member checks of analysis were sought to ensure that interpretations were supported. It was also important to avoid asking leading questions therefore semi-structured interviews considered question wording.
Power	In terms of my role as both teacher and researcher, it is important to consider how my status within the organization may affect the research process. It was important to ensure that confidentiality was maintained. In addition, interviews were conducted within the classroom or office of the interviewee. Issues relating to power and investigating the practice of peers is discussed further in section 4.10 below.

Table 12: Issues with insider research

Insider researchers are more likely to take things for granted, fail to ask obvious questions, fail to challenge assumptions and may struggle to 'make the familiar strange' (Delamont, 2002; Delamont & Atkinson, 1995; Mercer, 2007; Rabbitt, 2003). Being aware of these issues enabled me to deal with them as they arose. This included questioning the content of ICT lessons, in which I was involved in preparing and delivering, interviewing colleagues about their use of the VLE, where I personally had assisted them with their VLE development and discussing the results with participants in order to gain other perspectives. In being conscious of the need to not take things for granted, interviews were semi-structured to include 'obvious' questions and care was taken to question even the most 'obvious' of answers. This included, for example, asking questions about VLE training that I was involved in delivering.

As noted above, triangulation of data was an essential feature of the research design, in order to reduce bias. In addition, I was mindful of avoiding influencing the answers of interviewees or 'putting words into their mouths' (Mercer, 2007; Unleur, 2012). In particular I considered questioning techniques from my professional practice, such as allowing 'thinking time' for the interviewee. As discussed above, observations were conducted with senior members of staff, in order to ensure that my observation judgements took account of multiple viewpoints.

4.10 ETHICS

It is important to note within the research design the ethical issues and considerations of the study, in particular the involvement of children in the research (Lindsay, 2000). Due to my role as teacher, a number of students were taught by me during the research process, therefore I was also responsible for assessing their work and this raises issues in terms of power dimensions. Informed consent is an area for particular note, as it is difficult to justify research without informed consent from participants and therefore this was sought at each stage of the research (Lindsay, 2000; Gregory, 2003; Hammersley & Traianou, 2012).

Following BERA guidelines (Hammersley & Traianou, 2012), the students, their parents, and teachers involved were provided with information about the nature of the research, their role in it and information about what will be done with the findings, and were then asked for their written consent. There were a small number of queries from parents with regard to how participation or non-participation may affect their child's education and, after discussion of their concerns; permission was granted for their children to participate. One parent refused consent, but did not provide a reason. It was pleasing to note the number of requests from parents regarding giving their consent to the research, as they indicate that their consent was indeed informed and the information given out fulfilled any ethical concerns.

With respect to BERA formal ethical guidelines (Hammersley & Traianou, 2012) five key criteria are identified: minimising harm, respecting autonomy, protecting privacy, offering reciprocity and treating people equitably. Procedures adopted here

recognized these guidelines for good practice in educational research, as set out in table 13 below.

BERA Guidelines	Explanation
Minimising harm	Minimising harm is considered in terms of the research participants and the research setting, including through analysis or research findings and reports. It important to consider here that the report findings should be sensitive to the need for the researcher to continue working within the organization while still reflecting reality.
Respecting autonomy	Here, due to the dual role of teacher and researcher it is important that students had a choice to participate or not. Considering power dynamics between teacher and student, while seeking consent from parents in addition to students may in fact mean that their choice over whether to participate is not solely autonomous, this links with the above requirement to minimize harm. Here, informed consent was obtained from both parents and students, and in addition support was obtained from the pastoral Head of Year, tutors, and the SLT in ensuring students understand their choice to participate.
Protecting privacy	It is recognized that privacy is difficult due to the Internet and availability of information about the researcher but the report will anonymize participants including avoiding identifying them through their role.
Offering reciprocity	In terms of reciprocity, non-monetary rewards for students were offered, following the school behaviour policy.
Treating people equitably	It is clear that there should be no discrimination or favouritism as a result of participation or non-participation in the research. Support was obtained from the SLT and the Head of Department (HoD) in lesson observations to ensure no effect in my teaching role. Through the use of marking rubrics and moderation processes in the department that limited my discretion in the assessment process and allowed for my marking to be checked and validated. This ensured that there was no discrimination or favouritism in my assessment practice.

Table 13: Interpretation of BERA Guidelines (Hammersley & Traianou, 2012)

In considering the issue of the prior relationship between the students and the teacher-as-researcher, which is particularly pertinent to this piece of research, as the teacher can be considered to be in a position of power, it is important that students do not feel pressured into taking part in the research (Masson, 2000).

It is clear that there are particular ethical challenges in this dual role of the teacher as researcher and to ensure ethics and quality of outcomes are maintained, it is important to be aware of the nature of the two roles as openness can be a means to avoiding conflict (Hitchcock & Hughes, 1995). In view of this exploration of informed

consent, learners in the research were introduced to the research through a whole year group assembly and within discrete ICT lessons. They were then invited to give consent to be involved in the research through information sheets and consent forms outlining the aims and expected involvement of the research. Due to the age of the learners, parental or guardian approval was also required and so a second information sheet outlining the research (as above) was mailed directly to the parent or guardians. Additional consent forms were provided during the interview process, for those students involved in interviews. Staff were also provided with information sheets and consent forms during the interview process. All information sheets and consent forms can be found in appendix A.

As noted above, a number of other ethical issues may have arisen due to the dual role of researcher and teacher, including pupils feeling obliged to take part. There was potential for possible favouritism towards those who co-operate; for finding out information as a researcher that I would not have access to as teacher and for assessments to have been biased through my role as researcher. These issues were considered and strategies to avoid or deal with these occurrences were identified:

- Pupils were informed that they were not obliged to take part and, if they agree to take part in the research, the students were reminded at each stage of the research that they were able to withdraw and do not have an obligation to continue to take part.

- Throughout the process, the Head of Year and other tutors were involved, thereby allowing students to deal with a third party.

- As previously stated, due to the age of the students, consent was obtained from a parent or guardian.

A further ethical consideration was that of ensuring impartiality as a result of co-operation, or non-cooperation. For this, support was sought from the Head of Department and the SLT. This included moderation in terms of assessment within the department facilitated by the Head of Department and support from the SLT in terms of lesson observations. With respect to the type of information to be gathered, this related to ICT use and attitudes to the VLE and e-portfolios. It is typical data collected in 'student voice' activities that are regularly undertaken within the institution and so, with this in mind, it is unlikely that as a researcher I would find out information that I would not have access to as teacher. However, should this have occurred, the school's child protection and reporting procedures would have been followed (if appropriate). Students were reminded that, as is always the case within school, no conversations could be considered private. While the role of researcher may have had an effect on my role as assessor, there are clear marking rubrics and guidance for the assessment of Key Stage 3 ICT evidence and these were followed and internal moderation undertaken.

It was not envisaged that the study would involve subject matter of a sensitive nature, that the research procedure, methods of collection and analysis or publication would cause anxiety or distress (Cohen et al, 2000); or that the students involved in the research would receive any negative consequences as a result of the research. However, if such ethical issues had arisen in the course of the research, they would have been dealt with immediately with respect to the advice given by the authors quoted here and through consultation with parents/carers and the institution's SLT. Anonymity has been provided, of course, through pseudonyms and, where necessary for staff, through generalizations of job role as it is noted that persons can be readily identified if there is only one person with that role (Lankshear & Knobel, 2004).

In terms of ethical issues regarding working with colleagues, there are issues in terms of power and investigating the practice of others (Hopkins, 2002; Sikes, 2006; Mercer, 2007). As described by Sikes (2006), the research process may impact on personal and professional relationships within the work place. It may be the case that colleagues are reluctant to discuss aspects of their views and practice (Mercer, 2007; Sikes, 2006).

However, here teachers and SLT members were fully supportive of the research process. No members of staff refused to take part in observations or interviews and with some staff requesting to be involved further to add to their questionnaire responses. As described by Hopkins (2002) a number of ethical principles were followed including obtaining permission at each stage for interviews, observations and document analysis; reporting progress; encouraging feedback from respondents in terms of interview transcripts and observations and maintaining confidentiality.

4.11 CONCLUSION

This chapter outlined the research methods and methodology of the study. As stated throughout, a case study approach has been undertaken making use of both quantitative and qualitative methods including questionnaires, semi-structured interviews and observations, usage statistics and document analysis involving participants drawn from the population of students, teacher and parents associated with the school. This chapter has also considered a range of relevant concepts, including generalizability, triangulation and validity. In addition, this chapter also explored the ethical issues arising from research involving children together with issues relating to conducting research within my own institution. While the research design is further evaluated in the concluding chapter, the strengths and limitations of the research design with respect to my dual role as teacher and researcher have been considered. Chapters 5 and 6 follow, presenting and analysing the results of data collected here.

Chapter 5 – Why ICT is Used and Not Used

5.1 INTRODUCTION

This chapter focuses on second order barriers relating to teachers' beliefs, as analysis of interview and questionnaire data did not find first-order barriers to be an important factor in explaining variation in practice. The chapter first examines the leadership of ICT within the school, considering school policy and vision and how leadership of ICT affects practice. It will be shown that, through the introduction of the Teacher Effectiveness and Enhancement Programme (TEEP), the Senior Leadership Team (SLT) expect teachers to make *effective use of ICT* to support teaching and learning. Interpretation and understanding of what effective use of ICT entails will be investigated, followed by a consideration of how issues of power and control with respect of the use of ICT affect classroom practice. One issue affecting the use of ICT discussed in the literature and in questionnaire and interview responses is that of Continuing Professional Development (CPD). This chapter concludes by exploring how CPD within the school is organized and its effectiveness in developing the use of ICT.

This chapter will show that different views of ICT exist within the school; in particular there are tensions between the SLT and other teaching staff. Table 14, below, gives an overview of the issues to be considered within this chapter.

Issue	Senior Leadership Team	Teaching Staff
Vision, support and guidance	The vision for the use of ICT is made clear through the school's adoption of the TEEP planning process.	Within and between departments there is inconsistency in terms of how the vision is implemented. Further support and guidance may be required.
Use of ICT to support Teaching and Learning	The benefits of the use of ICT are clear; ICT is effective in supporting learning across the curriculum. It is up to teaching staff to find imaginative and creative ways of making use of the available technology.	The use of ICT sometimes creates challenges for teachers in terms of how they see their role within the classroom. Benefits of the use of ICT are affected by other constraints, for example, exam board requirements.
Effective use of ICT	Student use of ICT is important. Students should make use of ICT to demonstrate knowledge and understanding in all subjects.	While student use of ICT is important; teachers find the use of ICT to support administrative tasks beneficial to their teaching. Some teachers make imaginative and creative uses of the technology; however this is not always recognized by the SLT.
Continuing Professional Development (CPD)	Teaching staff should identify their own areas for development. Training is provided by other teachers within the school.	

Table 14: Contrasting views of the SLT and teaching staff

5.2 School Policy and Leadership of ICT

Leadership of ICT has been shown to be an important factor in terms of whole school integration of ICT to support teaching and learning, both within the literature (Afshari et al, 2009; Gibson, 2002; McGarr & Kearney, 2009; Tondeur et al, 2008), as described in chapter 2, and in the data collected in this study and presented in this chapter. This section first outlines the school policy relating to the use of ICT, particularly the

adoption of the TEEP planning process, before discussing how this vision is understood by staff and the extent to which the teaching practice of the SLT reflects this vision. The school context with respect to the adoption of TEEP lesson planning process and school policy with respect to ICT to support teaching and learning is outlined. Lesson observation statistics collected by the SLT within the school indicate that teaching and learning has improved over the last five years when considering this measure. The SLT see the introduction of TEEP as playing an important part in this improvement. Policy concerning the use of ICT to support teaching and learning refers to *Effective use of ICT* and section 5.3 discusses how this phrase is interpreted by the SLT and teachers in the school.

5.2.1 TEEP and School Policy

As is described in section 1.2.2, at the outset of the study and in response to OfSTED inspection feedback identifying the need for improvements in teaching and learning, the SLT had introduced TEEP to all staff as the method of lesson planning required. As discussed in section 3.3.2, the elements of the TEEP model are shown in table 4.

> *"Teachers are expected to immerse themselves in the methodology of the TEEP framework and exercise the freedom to plan creatively within this… Lesson planning should incorporate, in some format, the elements of the TEEP Model" (SLT – Teaching and Learning Policy)*

Recent lesson observation statistics show that the percentage of lessons graded good or outstanding was 79% in the most recent OfSTED inspection in September 2012 and 87% in terms of internal monitoring in September 2013. For members of the SLT, the adoption of TEEP is perceived as significant in developing the quality of teaching and learning.

> *"TEEP has been part of a big improvement in teaching, learning and standards" (Interview response, SLT A)*

As is discussed further in the literature review in chapter 2, the TEEP concept includes '*Effective use of ICT';* ICT is identified as an *underpinning element* in the lesson planning cycle.

The TEEP literature describes "effective use of ICT" as:

> *"The use of ICT within the classroom to enhance the learning experience. Only using ICT where relevant and where the outcomes would be positive" (Ragbir-Day et al, 2008)*

The school's technology college specialism also identifies the requirement for the school to make 'effective use of ICT' across the curriculum to enhance teaching and learning.

> *"Technology colleges should develop a technologically rich curriculum through effective use of ICT and innovative e-learning to raise standards and enhance the quality of teaching and learning in specialist subjects and across the curriculum" (SLT – requirements of school specialism documentation).*

In addition, the school's ICT Vision documentation identifies the requirement of a learning platform, with a focus on supporting learning beyond the school time and place.

> *"By 2008 Local Authorities (LAs) will need to have provided a personalized learning space for all students, with the potential to support e-portfolios. By spring 2008 LAs will need to have ensured availability of a learning platform with (at least) basic functionality to all their schools. There will also be a strong emphasis upon the ability to work and communicate virtually, within on-line communities. This will be particularly valuable for groups of learners and carers needing access to support and resources away from the school" (SLT – ICT Vision Documentation)*

> *"Connectivity to school resources will be through the development of a learning platform that will allow parents access to specific school information and resources" (SLT – ICT Vision Documentation).*

This description provides background information with respect to the adoption of TEEP and the school policy relating to the use of ICT to support teaching and learning. The next section considers how this vision is understood and interpreted by teaching staff.

5.2.2 Vision, Support, and Guidance

As discussed above, the SLT vision for ICT integration and practice is articulated through the introduction of the TEEP lesson planning process and within school policy documentation. However, for some staff, interview and questionnaire responses below indicate that this vision is not well understood as guidance for teaching staff is limited. Using these data, this section shows that understanding of the vision varies and that support and guidance from middle and senior leaders is an important factor.

In order to consider how the SLT monitor and incentivize the use of ICT within department, members of SLT were interviewed about how important they saw review of departmental use of ICT within the line management process. The line management process involves meetings between the SLT and middle leaders (Heads of Department), and meetings between Heads of Department and teaching staff within that department. Responses here showed that, despite ICT being identified within the TEEP process as a core-underpinning element, use of ICT may not often be discussed between SLT and middle leaders but is perhaps something that should be handled by middle leaders within their department. However, this is contrary to literature on successful ICT integration, where it is suggested that a whole-school approach is more effective (Newhouse, 2010; Lee & Gaffney, 2009).

> *"If line managers were doing a series of lesson observations with a member of SLT and there was a lack of ICT use we'd be asking question why that might be but I don't often discuss it and we don't formally report on it" (Interview response, SLT A)*

> *"I see this as a departmental issue that should be discussed at department meetings, not at line management meetings" (Interview response, SLT B)*

These responses from SLT reinforce the view that, for the SLT, the vision for ICT use is clear and that it is up to individual teaching staff to implement this vision. However, for some members of SLT, this question prompted reflection about school practice.

> *"ICT use is not discussed as much as it could be or perhaps should be within line management meetings" (Interview response, SLT E)*

The view, that there is not a coherent strategy for the use of the ICT including the VLE, is demonstrated in teacher questionnaire responses.

> *"There doesn't appear to be any standardization with regards to ICT use in [my subject], resources are shared via the VLE and staff communicate well through email however, there has been no formal meeting to address how ICT is used and what improvements can be made such as by sharing tasks/creating schemes of work that include ICT" (Teacher questionnaire response, English).*

> *"The use of ICT across the school is inconsistent between different members of staff (there is a core group of staff that regularly use ICT and another group that never use ICT, there is little middle ground use)" (Teacher questionnaire response, ICT).*

For other staff, this is highlighted in terms of a lack of guidance or support for ICT use

> *"I don't get any guidance whatsoever. In some cases it varies among the personnel, there are some that are more knowledgeable than others and if you want to know about a certain product or if you have a hardware problem you can get the information but how you can use the ICT provision within your lesson – you don't get any support" (Interview response, Teacher L, MFL).*

> *"These aspects of ICT have not come up in department meetings and I do not have a clear view of the whole school vision" (Teacher questionnaire response, English)*

> *"…we need to get to that next step of using the VLE. It's not that we don't want to use, it's just getting to that next stage and having support would enable us to know how to develop VLE use" (Interview response Teacher M, Music).*

Daly et al (2009) consider the need for whole school vision and guidance on developing the use of ICT as important in successful technology integration. The above responses are interesting in that they demonstrate that teachers feel there is a lack of vision or of guidance for ICT in the school. Whereas the SLT believe that the vision is in the TEEP programme that has been fully adopted by the school, supported by policy documentation and made explicit to staff through this. This raises questions about what counts as guidance and how the view of the SLT, that it is up to individual teaching staff, is interpreted in practice and is discussed further within the recommendations in chapter 7. The following section considers further how SLT practice affects teaching staff use of ICT.

5.2.3 Visible Use of ICT by the SLT

For teachers to take time to integrate ICT into their own practice, it is important that they see that ICT is used by members of the SLT. It is suggested (Lee & Gaffney, 2008; Newhouse, 2010) that, where the SLT do not make use of ICT in their own practice that teachers do not perceive ICT use as important. This section shows that not all members of the SLT within the school incorporate ICT into their own teaching practice in a way which supports their vision.

For some members of the SLT, ICT was incorporated in ways which supported their vision for student-centred learning and active use of ICT by students.

> *"Students produce animations and more traditional PowerPoint presentations as a way of presenting their learning, understanding and knowledge" (Interview response, SLT D).*

> *"Students make use of ICT in creative ways, for example creating their own cartoons" (Interview response, SLT E).*

However, some members of SLT felt that they were not as familiar or comfortable with the use of ICT to support teaching and learning but felt pressure to do so in terms of following the TEEP lesson planning requirements set out in school policy.

"I think that [ICT use] is totally embedded with the TEEP cycle, the emphasis is that it should be used. It's one of those central planks of TEEP that we have all been taught about and encouraged to use so I think it is well embedded. Your skills only get better by doing it, you go to a course and learn about it but then my classroom was my little kingdom and you don't have to do anything unless you wanted to but now you do as it's there in TEEP and you kind of have to look at it" (Interview response, SLT E).

It is interesting to note here that, through the new build process, all classrooms are equipped with interactive whiteboards (IWBs), perhaps forcing the adoption of the technology by removing choice as is illustrated by SLT B in the quote below. Section 5.3.3 discusses this further.

"My reasons to use ICT in my own lessons are that I really have no choice. I have been forced into it as I only have an interactive whiteboard so everything has to use ICT. I bought a whiteboard due to worrying about ICT not working during lessons and my insecurity about having to use ICT" (Interview response, SLT B)

The above two responses demonstrate that the SLT members feel a pressure to integrate ICT into their own practice. For SLT B, the quote above indicates that their view of ICT in practice does not conform to the school vision. It is not clear from the data whether these members of SLT understand the importance of their use of ICT on that of other teachers.

It is also clear that some members of the SLT feel that the use of ICT would not improve practice in areas such as assessment, and do not want to enforce whole school policy that they do not see as useful.

"Currently there is whole school focus on cross-curricula literacy and numeracy, and on marking and assessment together with the continual push for improved teaching and learning outcomes and improved teaching and learning observation average scores. If we then say we also need to do a lot of work as a whole staff to improve the use of ICT then that starts to dilute improvements in everything else, including in ICT use" (Interview response, SLT C).

"I don't want to use ICT for marking personally, so I wouldn't suggest that whole school moves to use ICT for assessment" (Interview response, SLT B).

It can be seen here that, for members of the SLT, ICT use is an area where practice can improve, but that other issues within school take priority for whole-school initiatives. This is understandable due to the national educational emphasis on improving outcomes in literacy and numeracy, as indicated by SLT C above, yet it is interesting to note how ICT is being constructed and valued through these responses. Despite the inclusion of ICT within the TEEP lesson planning process, for some members of SLT, ICT is not viewed as important and may identify a lack of understanding of how ICT can be used to support areas such as literacy, numeracy and assessment. There is also an indication that there are questions to be raised about the understanding of what effective use of ICT is in practice, as is covered in section 5.3.

5.2.4 Summary

This section has shown that school policy relating to the use of ICT to support teaching and learning makes extensive use of the TEEP planning process. Through this, the SLT identify their vision for the use of ICT to promote student-centred learning. It is clear that, for the SLT, it is the responsibility of the teaching staff to implement the school policy but for some teachers, there is a lack of support and guidance. In contrast, members of the SLT do not perceive an issue with the support and guidance available showing tension between groups within the school. Recommendations in chapter 7 address this issue further. The following section investigates further the differing views of both the SLT and teaching staff as to what *Effective use of ICT* entails.

5.3 WHAT IS EFFECTIVE USE OF ICT?

The previous section made reference to '*effective use of ICT*' both within the TEEP model and the school's technology college specialism in terms of how the SLT articulate the vision for using ICT to support teaching and learning. The introduction of TEEP provides the guiding principles for the teaching and learning policy within the school. This, together with specialist school status and local authority guidelines,

places emphasis on the use of ICT to support teaching and learning. Interview data from the SLT indicates that the introduction of TEEP should promote constructivist, student-centred learning and that 'effective use of ICT' supports this pedagogy. For the SLT, this means that the use of ICT should, for example, enable students to collaborate, construct meaning and demonstrate understanding within all subjects.

However, *effective use of ICT* is a difficult concept to define. This section uses data from questionnaire and interview data, to consider how this concept of '*Effective Use of ICT*' is understood by both the SLT and teachers, showing how differing interpretations result in variation within practice. It will be shown that *effective use of ICT* is considered in terms of supporting learning, presenting information using the IWB, and supporting teaching, and within these areas there are differing views.

5.3.1 Using ICT

In terms of supporting learning, through interview, five members of the SLT were asked what they look for as evidence of the use of *effective use of ICT* in lesson observations and this provided a range of responses. For some members of the SLT, *effective use of ICT* entails making use of some form of ICT to support teaching and learning within lessons, as indicated by SLT B below.

> *"ICT is now embedded in teaching and learning in the sense that everybody now has to use some form of ICT in lessons as a result of TEEP" (Interview response, SLT B).*

However, other members of the SLT are more critical about the use of ICT within lessons, identifying that ICT use should be fit for purpose.

> *"If you walk into a classroom and see ICT being used, the first question is for what purpose and is it fit for purpose. Just because they are using ICT does not mean that it is that necessarily appropriate use" (Interview response, SLT A).*

Student interaction with ICT is viewed as important, rather than where students are passive users of ICT.

"It's the interaction between the students and ICT, not just the teacher showing off. So I suppose what I'm looking for is the students interacting with ICT, not just watching something impressive as you learn by doing" (Interview response, SLT E).

Again, student use is identified through use of the IWB beyond its presentation capabilities and use of voting pads.

"If you go around and see the way in which staff are utilising ICT, from the interactive whiteboards being increasingly used interactively not just as a presentation tool; you see the voting pads and that sort of technology being used. I think lots of staff have grasped that effective use of ICT, and it's about moving the school forward in this direction" (Interview response, SLT D).

In this response, SLT D identifies the need for 'progress' by teaching staff in terms of how ICT is used. The idea of 'moving the school forward in this direction' and of 'progress' is viewed in terms of staff encouraging students to make use of ICT to support learning and this use of ICT should be incorporated across the curriculum. This is indicative of the SLT view of the use of ICT within the school in terms of how the technology itself is not seen as problematic and that it is up to teaching staff to develop the use of this technology. This thereby shifts the problem to the teachers and links with issues of power and control, as discussed further in section 5.4.

The idea that ICT use should be integrated to support learning rather than an end itself is also identified.

"We [should] use ICT to make learning happen rather than using it as a separate add-on that the students can't integrate into what they are doing. ICT should be part of every subject in this way" (Interview response, SLT E)

The need for staff to make use of ICT in *imaginative and creative* ways is highlighted with a particular focus on the use of the school's TV studio.

"The main creative element of technology in the school is the TV studio and the cameras and audio stuff we have in there that we use with students. The media department runs the multimedia and TV studio as a tool for any subject and links

up with the English department, filming speeches and a whole host of other ways, in fact it's limitless. You can use the green screen to be in any environment for any subject, music, science, PE etc. and it's up to staff to be imaginative and creative" (Interview response, SLT D).

The requirement for teaching staff to be imaginative and creative with their use of ICT is perceived as important by the SLT, but raises questions of what imaginative and creative practice entails. In the quote above, SLT D identifies use of the TV studio as important in terms of enabling students to demonstrate their knowledge. However, this may show a lack of vision on behalf of the SLT, particularly in terms of available Web 2.0 tools and other elements of technology such as students' personal devices. Other members of teaching staff, as described further in this chapter, make use of students' mobile devices to film experiments in science, uploading these and explaining the processes involved and the use of Web 2.0 tools such as *fakebook* to create character profiles in English. These examples meet the SLT requirement for student interaction with ICT and allow students to demonstrate their understanding but are perhaps overlooked by members of the SLT.

These differing views of the SLT lead to variation within practice of teaching staff as teachers struggle to integrate conflicting views and, as described above, where guidance and support may also need to be developed. Some teachers share the view of the SLT of the importance of student interaction with ICT.

"ICT is a useful tool and can reach and engage students of all levels improving their overall understanding through visual and hands on methods. It allows children to progress at their own pace and encourages them to be self-motivated and work independently" (Teacher questionnaire response).

"I use ICT to engage students by using video, music, audio and visuals and interactivity, and to make transitions easier. ICT gives a variety of ways to teach and learn" (Teacher questionnaire response).

However, other members of teaching staff focus on the need to use ICT because it is expected by SLT, rather than for meaningful pedagogic purposes.

"I use it because the facility is there, it's what we're expected to do and it's the modern way" (Interview response, Teacher E, PE)

"Too often however 'PowerPoints' are used to aid 'chalk and talk' or 'poor' teaching, or students are just chucked onto laptops to 'do some research'" (Teacher questionnaire response)

"ICT needs to be used appropriately and effectively, not just let's put on a YouTube clip as this will engage the students" (Interview response, Teacher A, Art)

Bertram & Waldrip (2013) found that if the pedagogic reasons to use ICT are unclear, it is unlikely that teachers make use of the technology and is implied in this study by the above quotes. This is also supported by Kim et al (2013) in terms of how differences in beliefs about effective teaching and beliefs about knowledge and learning may lead to why teachers use ICT differently. The above quotes show that different views of ICT exist within the school in terms of how ICT can be used to support learning. There are also implications in terms of CPD as addressed further in section 5.5.

5.3.2 Presenting Information Using the Interactive Whiteboard (IWB)

Of particular note here is the school's use of ICT to facilitate teacher presentations, as analysis of lessons plans, discussed further in chapter 6, highlight the prevalence of IWB use across the school. Whilst this supports the teacher in one aspect of the their role, this perhaps reinforces behaviourist teacher-centred pedagogy, rather than supports the SLT vision for student-centred learning as indicated above. Again, SLT responses ranged from seeing teacher use of the IWB as *effective use of ICT* to the expectation that teachers would use additional hardware and software in addition to the IWB and highlighted the importance of student-centred use of ICT.

Through questionnaire responses, all teachers identified that they use ICT to present information to students with the following response indicative of many made by teaching staff.

"I use ICT to plan my lessons. All lessons have some form of Interactive Whiteboard or PowerPoint presentation" (Teacher questionnaire response)

This use of ICT is identified by some members of SLT as *effective* in terms of presenting information and as a motivational tool for student engagement.

> *"Part of the TEEP model is effective use of ICT; it's an effective teaching tool. It's a way of conveying information and engagement" (Interview response, SLT D).*

However, for other members of SLT the use of ICT to present information to students is not seen as *effective* on its own and that ICT use should move beyond this.

> *"I think there are some lessons which I have observed in which it [ICT use] could be better, where it's just used as a vehicle for presenting new information" (Interview response, SLT C).*

In particular, the SLT highlight that there should be more use of interactive facilities of the whiteboard and increased active student use, rather than passive use.

> *"I think there is variation across subjects for how much teachers use the whiteboard in an interactive way and also whether they get students to use it" (Interview response, SLT B).*

> *"Sometimes you can go into lessons and the teacher has spent hours preparing an IWB resource and it makes no difference to the students' use of ICT, as there's no interaction" (Interview response, SLT E).*

As commented on in section 5.2.3, the decision of the SLT for all classrooms to be equipped with an IWB through the new build process means that, in practice, all staff must make use of this technology. This is supported by lesson planning statistics presented in chapter 6 where the majority of lessons planned involved the use of the IWB to present information or show video and images to students. Members of the SLT, in the above quotes, suggest again that effective use of ICT involves student-centred use of ICT rather than teacher-centred, as is supported by a number of authors (Ertmer et al, 2012; Ertmer & Ottenbreit-Leftwich, 2013). It is therefore interesting to consider the use of ICT by teaching staff for administrative purposes as this is identified by teachers as effective in terms of supporting teaching and learning but does not meet the SLT vision for student-centred ICT use.

5.3.3 Supporting Teachers

Perhaps in contrast with the requirements of TEEP and the SLT vision for student-centred learning is the use of ICT to support teaching. Through questionnaire responses, teachers were asked how often they used ICT to support planning, track pupil progress, store and analyze assessment data and for communication with colleagues and parents based on categories within Becta publications (Becta, 2010b). As can be seen in figure 9 below, 98% of staff use ICT for emailing colleagues and 92% of staff use ICT to support their planning. While ICT is used by 84% of staff to store data for formative and summative assessment, use of ICT to facilitate data analysis is less frequent. Data analysis is an area that is highlighted by a number of staff in terms of desired CPD, indicating that staff would make use of ICT for this purpose but require further training.

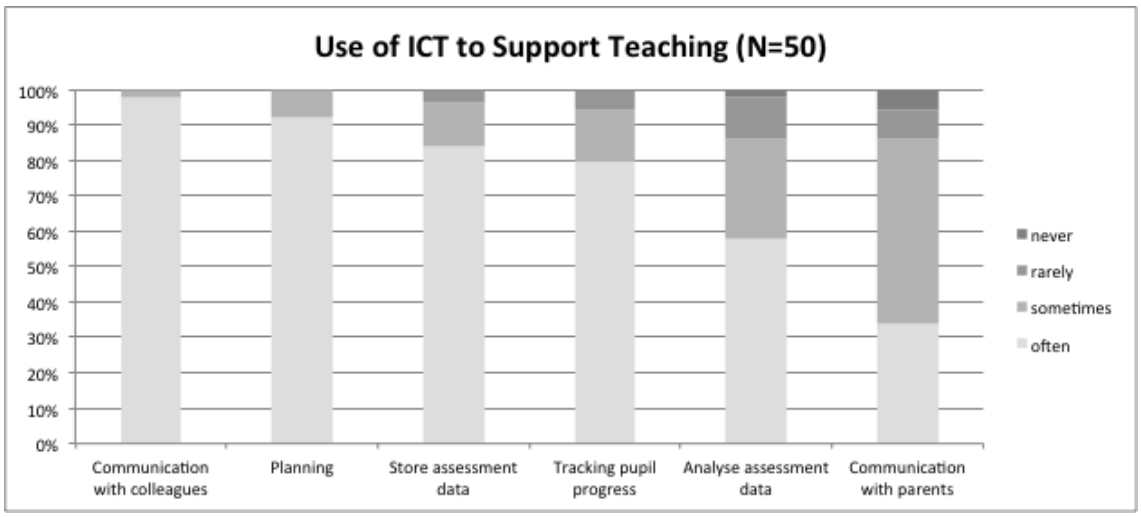


Figure 9: Use of ICT to support teaching

Through interview responses, teachers identified benefits in terms of time-saving, allowing for efficiency gains in administrative tasks as reasons for these uses of ICT. In particular, *Teacher G* identified the use of data analysis in identifying and targeting pupils for intervention in order to improve GCSE results.

> *"We are able to quite easily track progress of Key Stage 4 students through use of the VLE and other established monitoring systems we have built in. We are able to easily analyze data very quickly which means we can focus on individuals and*

specific groups and track progress over the whole school" (Teacher interview response, Teacher G, ICT).

As is illustrated below, some teachers identified how using ICT to prepare resources meant that they found it easier to differentiate and modify these resources to meet the needs of all students.

"I couldn't live without ICT, creating resources is so much easier and they are easily edited for new classes to ensure differentiation" (Teacher questionnaire response)

While these uses of ICT may be considered to be outside the SLT definition of *effective use of ICT* as described in the TEEP model, some SLT members also see this as an area for development, suggesting that ICT to support teaching can be considered to be effective.

"The school should make more use of the ParentPortal [software] for attendance and reporting; we need to enhance the school webpage, particularly for community engagement and improve use of the VLE, for example for homework and sharing resources with students" (Interview response, SLT B).

SLT B is therefore expanding the domain of activity in which either ICT is expected to have an effect or is viewed to be relevant for learning, from that of student use to also include teacher use in preparation, planning and assessment.

The technology is therefore used consistently and frequently to reinforce some aspects of the teachers' role such as planning and preparation. Teachers identify that using ICT to complete these tasks provides time-saving advantages. In addition, ICT can be used to enable deeper analysis of assessment data to identify and target specific groups of students.

5.3.4 Summary

This section has shown that, through the introduction of TEEP and through the school's teaching and learning policy, the SLT put forward their vision for student-centred learning. The use of TEEP, including the focus on *effective use of ICT*, is seen here as

the official discourse of the school through which the SLT seek to inform and shape practice. However, understanding of *effective use of ICT* varies and while there exists practice that conforms to the SLT's vision there is also evidence that ICT is in fact also to be used in teacher-centred ways.

As is described by Chen et al (2009); Ertmer et al (1999); Ottenbreit-Leftwich et al (2010) and Windschitl & Sahl (2002) teachers' beliefs about the use of ICT have a significant impact on their professional practice: teachers who believe that using ICT is beneficial are more likely to make use of it. For some teachers, ICT use is seen as beneficial and their views conform to the school policy and SLT vision. The use of ICT in practice is viewed as reflecting teachers' beliefs, roles and values, (Liu, 2011; de Koster et al, 2012; Hennessy et al, 2010; Moyle, 2006, Hammond et al, 2011; Kim et al, 2013, Ertmer et al, 2012) which implies that there are differences here between the SLT vision and some elements of ICT in practice.

In some cases the SLT vision is not enacted consistently. While the SLT see the integration of ICT as unproblematic, teachers find that issues relating to the use of ICT arise within the classroom, as discussed further in the next section.

5.4 Power and Control

Through analysis of interview and questionnaire data from teachers and senior leaders issues of power and control were identified. It will be shown here that teachers face pressure from SLT and external agencies to make use of ICT to support teaching and learning that meets the SLT's vision. The effect of ICT on classroom practice is also considered, where it will be shown that teacher beliefs and teacher role identity are important in understanding how ICT is used.

5.4.1 Vison and Innovation

As described above, through the adoption of TEEP, the SLT articulate the vision for the use of ICT to support teaching and learning. It is suggested that, while the SLT promulgate this vision, in practice it is up to teachers to interpret and implement this

vision. In addition, teachers find external agencies, for example, examination syllabuses, may exert different and contradictory pressures that conflict with the SLT vision for 'effective use of ICT'.

As highlighted above, it is made clear by the SLT that they see the role of the teacher as finding ways of integrating ICT into teaching and learning in imaginative and creative ways.

> *"It's up to staff to be imaginative and creative" (Interview response, SLT D).*

The SLT suggest that they expect that when ICT is used it should engage students and be used by students to demonstrate their learning.

> *"When I'm looking at ICT use its important to reflect on the level of engagement that it allows and the different way that it allows students to demonstrate or apply their knowledge" (Interview response, SLT A).*

As is explained below, this places pressure on teachers to find imaginative and creative solutions if the vision of the SLT is to be realized.

> *"The impact on the teachers is stress, time and having to keep up to date, continuously evolving practice" (Interview response, Teacher A, Art).*

Other priorities of teachers may take precedence before teachers devote time to developing their use of new technologies (Conlon & Simpson, 2003). For example, as described below, *Teacher J* identifies the role of exam syllabuses and controlled assessment tasks in how teachers make use of ICT:

> *"Some of the students now use the laptops to present their response to the coursework questions as per the [exam board] guidelines" (Anonymous teacher questionnaire response).*

> *"We don't just talk anymore about writing for a book or writing a letter and actually now we are starting to see the idea of the written examination questions acknowledging the idea you could 'write a blog to' or 'write the script for a web cast to' and we are seeing more of that and so unfortunately it's a case of to some*

extent the needs of exams and assessment driving the things that we cover" (Interview response, Teacher J, English).

This is clearly understandable in terms of the requirements for teachers to monitor their own and their students' performance based on externally defined targets (Buckingham, 2007). It is interesting to note that, for some teachers, external exam syllabuses are driving change in their use of ICT, as suggested above by teacher J.

5.4.2 ICT and Classroom Practice

Data from questionnaires and interviews with teachers below shows that some teachers view their own role as needing to embrace developments in technology and modify their practice as a result of the use of ICT. However, others see ICT use as detracting from learning, identifying issues of power and control with respect to student use of technology. It will be shown that teacher role identity is important in understanding beliefs and classroom practice.

A number of teachers are very aware of the social changes and the perceived need to keep up with the advances in technology and technology use. These teachers relate this to the developing role of the teacher and what makes 'good' teaching for them.

"I have always believed that this generation that we work with are the most media-savvy generation that has ever walked our planet. I very much think that, although teaching is a very old profession, the idea is we very much have to keep up with the lives of the students that we are looking to enrich and they live their lives amongst media, amongst ICT and amongst data and so I very much believe we have to be up to date, we have to be using all sorts of resources and as many as we can ICT wise that allow for that good teaching" (Interview response, Teacher J, English).

Teacher J above, in response to why they chose to make use of ICT to support teaching and learning in English, identifies the perceived need for schools and teachers to make use of ICT in ways that students do at home. One particular response highlights the

process of teaching, i.e. what is taught and how it is taught, describing this in great detail:

> *"I think that we need to make more use of what we know they use outside of school, inside school. I think it's silly to pretend Facebook doesn't exist and not make use of it. They have an awful lot of skills to do with technology so we need to teach them in school how to evaluate the information they find so they can decide its worth, as that's the skill they need. They don't need to recall huge chunks of information off by heart for an exam; the information is out there. But how we teach and what we teach has changed due to what access they have to information outside school. Like mobile phones – they have stopwatches and cameras – we should make use of these. Most of their phones have access to the Internet on their phones – the other day they had filmed an experiment and were really excited so I suggested they upload it to the science Facebook page. We have a Facebook page as I thought we can't stop them getting on Facebook so we should get on there with some science and that's what the student is going to do. He's going to upload his video that he's very proud of, blurring boundaries. These things don't have to be distractions; we can use them for learning and to keep the students motivated" (Interview response, Teacher F, Science).*

Again, *Teacher F* above, identified the need for teachers and schools to consider students' home use of technology and how teaching and learning in school can complement this with respect to developing students' skills of evaluating the information they find online. *Teacher F* sees the need for schools and teachers to make use of students' own devices in terms of using mobile phones as video cameras to capture practical aspects of science experiments. *Teacher F* identifies that, in making use of Facebook for learning purposes, this changes the perception of social networking as a distraction from learning and can be used to increase student motivation. This indicates a creative use of technology that is perhaps not recognized by the SLT. It raises a number of issues for teachers in terms of how ICT can be used; how students' use of ICT at home should or could be used to support teaching and learning in the school and the role of the teacher.

For other members of staff, there are concerns raised in terms of their control of how students make use of ICT within the lesson, for example playing games, and therefore distracting the students from learning:

> *"I would like greater control over them accessing stuff you don't want them to access in lesson; accessing YouTube can be a bit of a problem and a distraction" (Interview response, Teacher N, ICT).*

> *"It would be great if games were not accessible at all" (Teacher questionnaire response).*

> *"Students having access to games and internet sites can be a distraction for some - it would be good to be able to block access during a lesson" (Teacher questionnaire response)*

While, for some teachers, ICT was viewed as motivational, others found that continued use of technology means that it loses its motivational power:

> *"I do have a concern though that if students aren't immediately engaged then sometimes they get bored really quickly and I wonder if that's because everything happens within nanoseconds almost and sometimes it takes more than a nanosecond to introduce something in a formal teaching style it might do and that might be a negative" (Interview response, Teacher E, PE).*

> *"But when I was at school, we didn't have anything, just chalkboards and text books and I remember distinctly the teacher wheeling in the TV and you couldn't see her behind it, just see the TV being wheeled in and everyone was 'yes, we get to watch a video' as normally it would be chalk, talk, read a textbook and so we just found it amazing. Now when we watch a clip, they have so much access to it themselves, they aren't excited by it as they have so much access" (Interview response, Teacher Q, RE).*

Teacher Q above demonstrates the importance of prior experiences of teachers' own education on their practice and views of effective teaching and learning (Goodson, 1992) in terms of their teacher role identity. It is noted that, in order to make use of

ICT within teaching and learning, it may be necessary for teachers to alter their conceptions (Wadmany, 2011) in terms of technology, students, teaching and learning.

5.4.3 Summary

As is evidenced in the quotes above, teachers' views of the role of technology can raise issues in terms of how they perceive their role as a teacher and what makes 'good' teaching for them. This is also described by Donnelly et al (2011), Mumtaz (2000) and Ertmer et al (1999), in that how teachers view their role in the classroom is a pivotal factor in how they make use of technology to support learning. It can therefore be seen that teacher attitudes to the use of ICT play an important part in determining how the technology is used to support teaching and learning.

5.5 Continuing Professional Development

In many cases, it is noted that the changing nature of technology has a negative impact on teachers due to the need for them to keep up to date with both the technology and how to make effective use of it to support teaching and learning. Data presented above highlight the SLT's expectation that teachers will make *imaginative and creative* use of technology to support teaching and learning. However, there is evidence that teachers' use of ICT to support teaching and learning is variable. One approach to addressing this variability of ICT use is through effective CPD (Mueller et al, 2008; Ertmer & Ottenbreit-Leftwich, 2013; Harris & Hofer, 2011). This section examines the role of CPD within the school. Evidence collected in this study suggests that the program of in-house CPD adopted by the school could be developed by adopting a more organized approach and increasing the focus on pedagogy. In addition, there was also evidence that non-specialist teachers who worked within the ICT department perhaps developed their use of ICT to support teaching and learning within their own department, signifying this could be an effective approach to CPD.

5.5.1 Organization of CPD and Coaching Within the School

This section considers how CPD and coaching is organized within the school. Data from school policy documentation and interviews and questionnaire responses from SLT and teaching staff is used to show that the administration of CPD and coaching is handled primarily in-house. It is suggested that this in-house CPD and training could be developed with respect to its organization and developing the focus on pedagogy.

Through policy documentation, the school has identified that as far as possible CPD and training takes place in-house, primarily through the coaching programme.

> *"All teaching staff are involved in coaching relationships as part of their CPD entitlement" (SLT – Coaching Policy Documentation).*

In addition, the school has developed an in-house CPD programme with training sessions taking place every two to three weeks throughout the year. These training sessions are developed and run by members of staff within the school who are interested in ICT use. It is not made clear how their training is provided. The focus of these training sessions is identified through the performance management structure where individual training needs are identified, as is outlined in policy documentation:

> *"The school's CPD programme will be informed by the training and development needs identified in the training annex of the reviewees' planning and review statements" (SLT – Performance Management Policy).*

Through interview with SLT members, it is an expectation that staff self-identify their CPD needs with regard to ICT use. As is suggested through policy documentation above, it is also expected that coaching or in-house CPD be provided by other teachers to meet these needs.

> *"There is an expectation: if a teacher doesn't feel confident about ICT use, we'd expect them to be self-motivated enough to approach [someone] about their need for coaching" (Interview response, SLT A).*

However, within the ICT Vision documentation there is perhaps contradictory guidance that a rolling programme of needs analysis should provide a top-down identification of training needs rather than a bottom-up request for coaching identified above.

> *"Training and support for staff and users will be part of their on-going professional development. This will be based upon a rolling programme of needs analysis to ensure that all staff are confident and competent with the technologies being used at the school (interactive whiteboards, virtual learning resources authoring and management). The school will also focus upon how teaching staff are supported to deliver and support more flexible ways of learning and teaching that employ ICT" (SLT – ICT Vision Documentation).*

With respect to training and CPD, 68% of teaching staff reported through questionnaire responses that they identify targets relating to ICT within performance management or coaching. However, these targets often relate to skills development in terms of hardware and software use rather than pedagogic use of ICT for learning:

> *"I would like to receive ICT training maybe during training days. When it comes to databases and spreadsheet skills, I have absolutely no idea!" (Teacher questionnaire response, Learning Support).*

> *"We haven't been trained how to use the AverVision tool [Visualizer]. SIMS has lots of things that we aren't aware of. I have lots of little annoying things that bug me with software on both laptop and desktop, lots of error messages crop up all the time" (Teacher questionnaire response, Maths).*

Some staff explain that, while training sessions are available, finding time to practice these skills remains an issue

> *"There's lots of guidance available, it's taking the time. I find that my knowledge of ICT will grow as and when I have the time, whatever that means as we all have the time but we don't devote our time to that particular thing. There's lots of help and support around, we've had course on how to use interactive whiteboards, the problem with it is if you teach in a classroom every single lesson you use an IWB all the time whereas I have 2/3 of my time where we don't have access and as it's*

only a 1/3 of time I can get away with just knowing enough" (Interview response, Teacher E, PE).

"Time is needed not just to learn, but to apply what one has learned. I know we all were shown the VLE at the start of the year but I haven't had a moment to be able to explore or use it properly. This is entirely due to workload! I see how beneficial it would be but I need more time to learn how to use it effectively" (Teacher questionnaire response, Music).

It is important for CPD to develop teacher knowledge of technology and learning but also the process of change for innovation in ICT use (Wilson & McKinney, 2012). Ertmer & Ottenbreit-Leftwich (2010) identify that an effective approach to CPD may involve the development of a community of practice. However, it would appear here that, through coaching groups used within the school, there is scope to develop these communities of practice that is not yet being addressed, as is discussed further below.

5.5.2 The Role and Effectiveness of CPD for ICT Within the School

In this section, teaching staff and SLT views of ICT and of CPD is investigated. It will be shown that, in terms of those teachers that have positive views of ICT to support teaching and learning; CPD and sharing practice with colleagues is viewed as important. For the SLT, the need for CPD is identified as it is suggested that, by improving teacher skills, variation within practice would be reduced.

Teachers were asked a series of questions in order to identify their self-rated confidence in a variety of ICT based tasks and their attitude to the use, management, training and provision of ICT. By scoring these responses, teachers were grouped in terms of their confidence in their ability to make use of a range of software tools and their confidence in providing training to others. Those identified as having high confidence in their ICT competence had a more positive view of ICT, as shown below in table 15.

	Strongly Positive		Positive		Accepting		Negative		Total	
	N	%	N	%	N	%	N	%	N	%
Very Confident	4	80	1	20	0	0	0	0	5	100
Confident	0	0	6	60	2	20	2	20	10	100
Moderately Confident	5	27.8	5	27.8	4	22.2	4	22.2	18	100
Limited Confidence	6	23.1	4	15.4	3	11.5	13	50	26	100
Total N=59	15	25.4	15	25.4	10	16.9	19	32.2	59	100

Table 15: Teacher-reported confidence in ICT ability and attitude to ICT

In terms of teacher confidence, it is seen that even where access is limited and teacher confidence is high, students are likely to be guided towards making more use of ICT, implying that teacher confidence is important (Wastiau et al, 2013).

Teachers' reported own use of technology at home in terms of the amount and variety of use was also shown to be related to their views of the use of ICT within school. As is shown in table 16, teachers that make frequent use of ICT at home also have generally positive views of using ICT to support teaching and learning. However, limited home use may be a poor predictor of views of ICT as some teachers with low self-confidence in their ICT ability and low home use of ICT, had positive views of ICT.

	Strongly Positive		Positive		Accepting		Negative		Total	
	N	%	N	%	N	%	N	%	N	%
Daily use for a variety of tasks	3	37.5	5	62.5	0	0	0	0	8	100
Frequent use	6	50	1	8.3	2	16.7	3	25	12	100
Some use	5	25	4	20	5	25	6	30	20	100
Limited use	1	5.3	5	26.3	3	15.8	10	52.6	19	100
Total N=59	15	25.4	15	25.4	10	16.9	19	32.2	59	100

Table 16: Teachers' home use of technology and attitude to ICT

How teachers make use of technology at home can also influence how they make use of ICT to support teaching and learning (Prestridge, 2012). However, the causal relationship is unclear here and teachers could develop their own home use of ICT as a result of developing the use of ICT within the school context (Wastiau et al, 2013). It

may be the case that teachers who develop their own ICT skills also develop a more positive attitude towards the use of ICT as a result (Meyer et al, 2011).

Teachers demonstrate their commitment to CPD through their willingness to share their practice. This can be seen in figure 10, showing that teachers have a generally positive attitude to the sharing of practice.

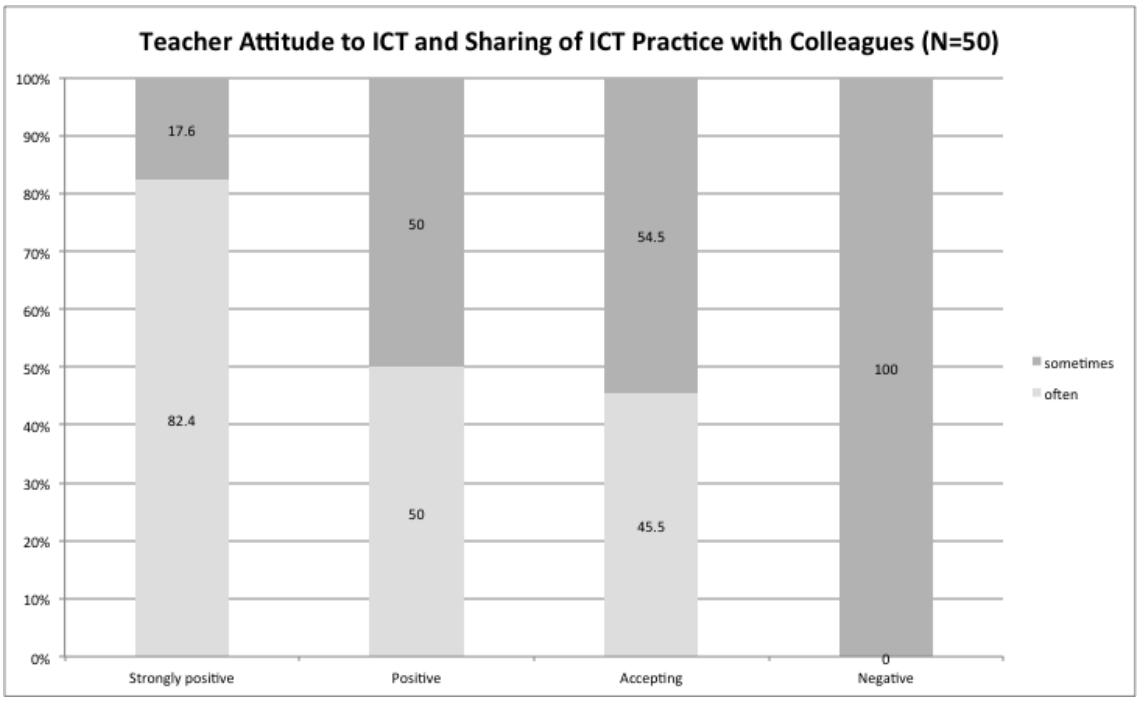


Figure 10: Teacher attitude to ICT and sharing of practice with colleagues

This indicates that teachers with a more positive view of ICT are more likely to share their ICT practice. It is suggested that the sharing of practice with colleagues in fact promotes a more positive opinion of this technology. This is supported by Donnelly et al (2011) and Mueller et al (2008) who found that teachers who form supportive groups with colleagues and are able to share positive experiences are more successful in their integration of ICT.

Through interview, members of the SLT express the need for developing the current approach to CPD for ICT to meet the ICT Vision documentation's aim of an organized programme of training.

> *"There are people who do it [use ICT] amazingly and it's not shared and that's where the gap is and it's a target for the school to develop a more consistent*

program of training across a number of areas with ICT being a crucial one" (Interview response, SLT C).

When focusing specifically on VLE training and use, the SLT claim that use is variable and attribute this to a lack of time or knowledge on behalf of staff, particularly the heads of those departments where it is not used. It is interesting to note that reasons for the use and non-use of the VLE do not identify any technology related issues or relevancy to the curriculum but focus on staff development.

"I think the VLE is relatively underutilized and the truth is it's patchy in some departments. When I was teaching [subject] there are teachers using a lot of VLE tools but there are other departments that don't use it at all. I know training has taken place; it's maybe something you need to look at and say we need a whole school concerted effort to be making the most out of it. It may be a lack of knowledge on behalf of Heads of Department, they don't know what it can do for them so they don't use it or they feel they haven't got the time or they haven't got that knowledge" (Interview response, SLT D).

For the SLT, improvements in staff knowledge and training would then lead to 'better' use of technology indicating that the SLT see a skills deficit in staff as explaining variation in practice, rather than questions about the role and value of ICT to support teaching and learning. However, despite this view, the SLT also consider that it is the role of teaching staff to identify training needs and that these needs can be met through in-house training.

5.5.3 The Effect of Working With or Within the ICT Department

In conjunction with CPD, coaching and mentoring, the promotion of teacher learning communities are seen as important in developing student-centred uses of ICT (Hammond et al, 2011; Wachira & Keengwe, 2010; Kopcha, 2012). As highlighted above, one aspect of CPD that the school makes use of is coaching, where all staff are involved in small coaching groups. It is suggested that it is through this coaching structure that staff form informal networks across departments that encourage sharing of practice. As will be discussed further below, an association with the ICT

department, through formal or informal coaching groups, is significant in developing ICT and VLE use.

Within the school studied here, teachers frequently find themselves teaching subjects out of their main subject specialism due to timetabling constraints. Often, this leads to teachers working within the ICT department to teach Key Stage 3, and sometimes GCSE ICT where they perhaps would not have chosen to teach ICT themselves. This means that teachers may find themselves working with the ICT department where they might not have chosen this themselves.

As can be seen in table 17, where teachers have had involvement with the ICT department through formal or informal coaching/CPD groups or through teaching ICT in addition to their own subject specialism, they make significantly more use of the VLE as is shown within VLE log data presented in chapter 6. This demonstrates the importance of CPD in developing VLE use.

X^2 (3, N = 50) = 15.9, p <0.001	**Often**		**Sometimes**		**Rarely**		**Never**		**Total**	
	N	%	N	%	N	%	N	%	N	%
Direct involvement with ICT Department	3	13.6	14	63.6	5	22.7	0	0	22	100
No direct involvement with ICT Department	3	10.7	5	17.9	9	32.1	11	39.3	28	100
Total N = 50	6	12	19	38	14	28	11	22	50	100

Table 17: VLE use and involvement with ICT department

In addition to VLE use, it can be seen in figure 11 that teachers that have had an involvement with the ICT department do not have negative views of ICT to support teaching and learning.

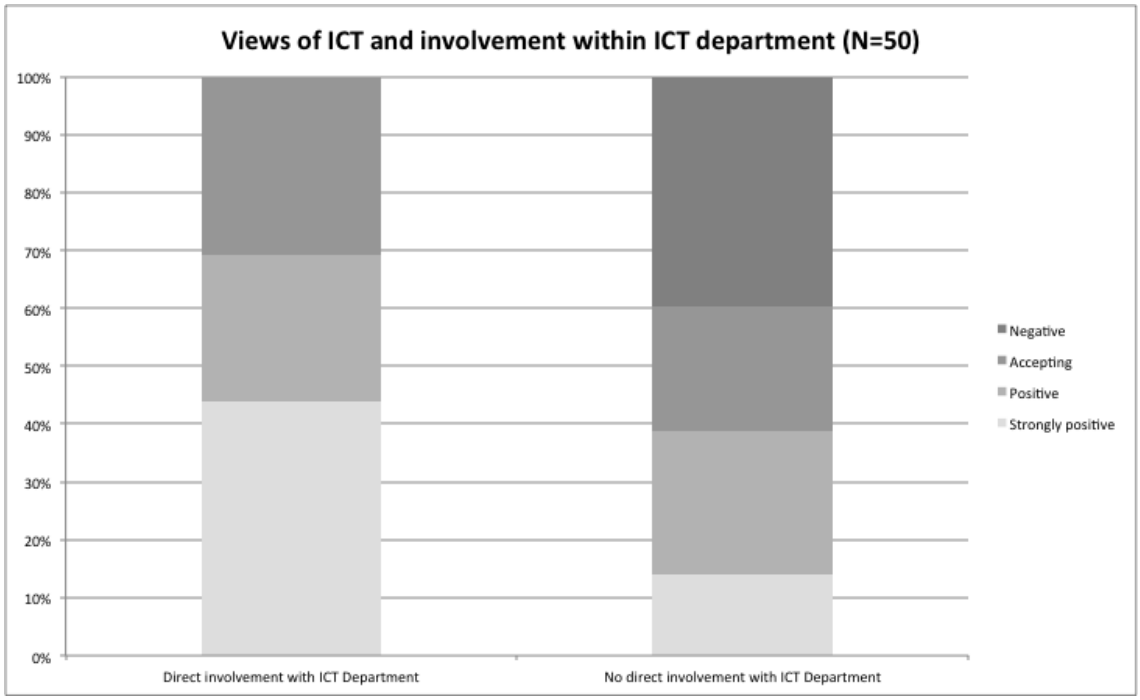


Figure 11: Views of ICT and involvement with ICT department

It is suggested that the ICT department is important in promoting the use of computer technology across the curriculum. This assertion is supported by the data that shows that, in terms of teacher attitude to ICT, involvement with the ICT department is significant (X^2 *(3, N = 50) = 10.1, p < 0.05*). Teachers who have involvement with the ICT department have a more positive view of the use of ICT to support teaching and learning as shown in figure 11.

As described in chapter 4, observations followed a 'learning walk' strategy where eleven lessons across eight subjects were observed. The observations were undertaken with a senior member of staff to allow for moderation of judgments. The observations made use of Starkey's (2011) digital learning matrix to evaluate the use of ICT to support learning. These observations were then analyzed in terms of involvement with the ICT department, as shown in table 18 below where purple arrows indicate connection with the ICT department and orange arrows indicate limited connection. There was a marked difference between staff that had a connection with the ICT department and those that did not in terms of the 'level of learning' as identified by Starkey (2011).

Level of learning	**Doing**	**Thinking about connections**	**Thinking about concepts**	**Critiquing and evaluating**	**Creating knowledge**	**Sharing knowledge**
	Isolated information. Focus on completing a measurable task.	Connecting thinking. Simple connections made within a context. Compare and share.	Develop conceptual understanding of 'big ideas'.	Evaluating and critiquing to explore the limitations and potential of information, sources or process.	Creativity – applying ideas, processes and/or experiences to develop a new reality.	Sharing new knowledge through authentic contexts and gaining feedback to measure value.
Observation A – Y10 Science	Researching chemical composition of everyday objects					
Observation B – Y10 Business Studies	Planning an enterprise event					
Observation C – Y8 Geography	Understanding earthquakes					
Observation D – Y8 English	Superhero comics					
Observation E – Y10 DT	Product design documentation					
Observation F – Y8 English	Identifying camera angles					
Observation G – Y8 Art	Creating and reviewing Julian Opie style portraits					
Observation H – Y9 Science	Planets and space exploration					
Observation I – Y7 ICT	Reviewing and creating Scratch projects					
Observation J – Y9 Mathematics	Personal finance online games					
Observation K – Y8 ICT	Creating simple games					

Table 18: Observation of ICT use, identifying connection with ICT department

Hennessy et al (2010) explain that the teaching of ICT as a discrete subject leads to teachers in other subjects not having training or experience in integrating ICT into their subject. However, in this study, many members of the staff involved with the ICT department have also taught a small number of discrete ICT lessons in Key Stage 3 and interview and observation data show that these non-specialist staff make use of ICT within their subject specialism that more closely meets the SLT vision, as shown above in table 18.

5.5.4 Summary

One accepted model of CPD follows three stages of development for progression in development and training of ICT - acquiring skills, integrating technology into the current educational process and developing and changing practice through use of ICT (Minaidi & Hlapanis, 2005; Kirschner & Davis, 2003; and Franssila & Pehkonen). It can be seen here, through the interview and questionnaire responses above, that in-house knowledge and informal networks attempt to cover these stages of development. However, CPD and coaching within the school may lack formal organization in how these three stages of development of the use of ICT are approached, as is indicated by SLT responses in terms of the requirement for the development of the CPD programme. In particular, CPD and coaching focus mainly on acquiring skills.

Earlier responses show that an organized programme of CPD with a greater focus on pedagogy would perhaps aid developing and changing ICT practice throughout the school as a whole. One specific area of sharing in-house knowledge and accessing CPD through forming communities of practice to be considered here is that of working with or within the ICT department. This is an area for development in terms of how the school can improve the use of ICT to support teaching and learning and forms part of the recommendations from the study.

5.6 CONCLUSION

In conclusion, through the introduction of the use of TEEP to structure lesson planning, and its use as the basis of the school's teaching and learning policy, the SLT have

articulated their vision for ICT integration and practice. In terms of the SLT's commitment to the TEEP program and school policy documentation, for the SLT, the role and value of ICT to support teaching and learning is not in question. This is also evident through the design choices in the new build school where each classroom is equipped only with an IWB, ensuring that staff must make use of this technology. Through responses to interview questions, SLT members identified that they perceive the role of teaching staff to make *imaginative and creative* use of the available technology. SLT interview responses also identified their view that progress for the school would entail developing the use of ICT to support teaching and learning and also to facilitate home-school liaison.

However, despite the stated commitment and belief in the use of ICT, not all members of the SLT are seen to support this in practice. While Lee & Gaffney (2008) and Newhouse (2010) identified that it is important for members of SLT to be visible users of ICT, some SLT members here do not make use of ICT in their own teaching practice. Some members of SLT stated that they saw use of ICT as an issue to be handled within departments and managed by the Head of Department, rather than something to be developed at whole school level. This is in contrast to Moyle (2006) who found that for ICT innovation and development to be successful, it is important for the SLT to lead the process and difficult for middle leaders to achieve whole school integration without SLT intervention.

While the TEEP literature clearly states that *effective use of* ICT is important in good teaching and learning, the meaning of *'effective use of ICT'* is unclear and interpreted differently both within the SLT and by teaching staff. For some members of SLT, student interaction with ICT is identified as an important factor, implying that teacher use of ICT does not meet this definition. However, other members of SLT and many teachers identified that they found the use of ICT to support teaching, through presentations using multimedia, and using ICT for administrative tasks such as analysing assessment data to be effective in terms of supporting learning. In addition, while members of the SLT stated that teachers should make *imaginative and creative*

use of ICT, it is suggested that the SLT perhaps have a limited view of what imaginative and creative use entails.

In contrast with the SLT view of the importance of ICT, teachers do not always consider ICT to be beneficial in terms of teaching and learning. ICT may be problematic in terms of addressing exam board syllabuses and subject curricula. For example, the requirements of controlled assessment (coursework) and written examinations could be in conflict with the need to use ICT to support learning. ICT use can also be viewed by some teachers as a distraction rather than of benefit to students in the learning process.

Through the literature, one way of reducing the divide between users and non-users of ICT is that of CPD and training. The SLT here see a skills deficit in teachers as main reason for lack of technology use but expect teachers to identify their own training needs. All teachers in the school take part in peer coaching and the school has devised a program of training delivered by other teachers in the school. While some members of staff view this process positively, it is suggested that the program of CPD could be developed in terms of its organization and improve the focus on pedagogy. In terms of CPD, working with or within the ICT department may make a difference to how staff use ICT in their own departments and also how they view the use of ICT to support teaching and learning.

The following chapter will present and analyze the results of data collected in terms of how teachers, parents and students make use of ICT at home and school. The use of ICT and the internet in general is considered, together with the specific use of the Virtual Learning Environment (VLE) – including the use of e-portfolios.

Chapter 6 - Use of ICT Across the Curriculum

6.1 INTRODUCTION

As outlined in chapters 2 and 3, the research questions concern how ICT is used within the school, including the use of the Virtual Learning Environment (VLE) both at school and to bridge the home-school divide. In addition, one specific application of the VLE has been investigated – the use of e-portfolios to assess students' ICT skills at the end of Key Stage 3.

This chapter describes how ICT is used within the school to support both teaching and learning. As discussed in chapter 5, there are tensions between how the Senior Leadership Team (SLT) would like ICT to be used and how teaching staff make use of available resources in practice. Data collected from the SLT and teaching staff show that first order barriers (Ertmer, 1999) are not a significant factor affecting the use of ICT and yet the use of ICT is variable both within and between departments.

This chapter will focus on the VLE and use of e-portfolios in more detail, investigating how the VLE is used and not used, including who uses it and discussing the use of e-portfolios to assess students' Key Stage 3 ICT performance. It will be shown that VLE use is variable for both students and staff, and is more often used within school rather than being used at home, as is seen as desirable by the SLT. It will also be shown that, despite engagement of both teachers and students in the process, the e-portfolio system was not successful. In particular, the user interface was found to limit the use of the e-portfolios.

In view of the research questions of how ICT is used by students at school and at home and whether the VLE can be used to bridge the home-school divide, this chapter concludes by considering how students make use of ICT at home and how this affects their ICT use at school. It will be shown that students make use of ICT at home in ways that are consistent with other research (Eynon & Malmberg, 2011) but that teachers'

perceptions of students' home ICT use are an important factor in how teachers make use of ICT to support learning.

6.2 Use of ICT Across the Curriculum

As has been described, at the outset of this study the school was well-equipped with new technology through the new build scheme. Throughout questionnaire and interview responses from support and teaching staff, there is a willingness to make use of ICT across the curriculum. This is evidenced by 99% of teacher questionnaire responses stating that the use of ICT is important in delivering 'good' lessons. However, 80% of teachers also identified the need for their department to develop the use of ICT further. It was noted that first order barriers, in terms of access and reliability of equipment did not appear to occur here. Analysis of teacher questionnaire data found that 98.5% of staff stated that the ICT provision of the school is better than average. Through interview, fifteen teachers and five members of the SLT were asked how they found the ICT provision and technical support. All respondents identified the provision as good or excellent and seventeen identified that technical support ensured reliability of equipment.

This section will make use of data collected through lesson plan analysis, staff questionnaire and interview data along with student questionnaire and interview data to identify how ICT is used to support teaching and learning across the school. It will be shown that there is variation within and between departments in terms of how ICT is used. In terms of explaining this variation, evidence collected here suggests that teachers' confidence in their own ICT skills can make a difference in terms of how they expect students to use ICT.

6.2.1 Supporting Teaching

In this section it is shown that the use of ICT to support teaching, including administration tasks and the preparation and presentation of materials, is important to teachers but that there are some areas for development in terms of the use of ICT to support assessment and analysis of data.

As described in chapter 4, lesson plans for one day were used to support findings from teacher questionnaire, interview and observation data in terms of how ICT is used to support teaching and learning. The content of these lesson plans were analyzed and planned uses of technology were identified, then divided into teacher-led use of technology or student-led use of technology. Teacher uses and student uses were then broken down into different activities, as is shown in figures 12 and 13 below.

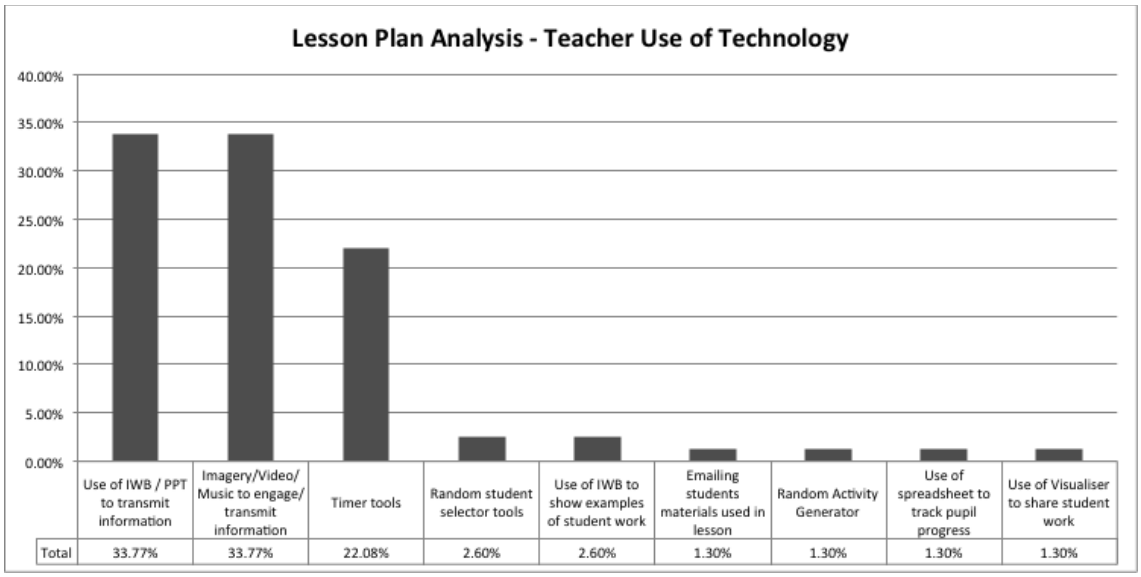


Figure 12: Lesson plan analysis – teacher-led use of ICT

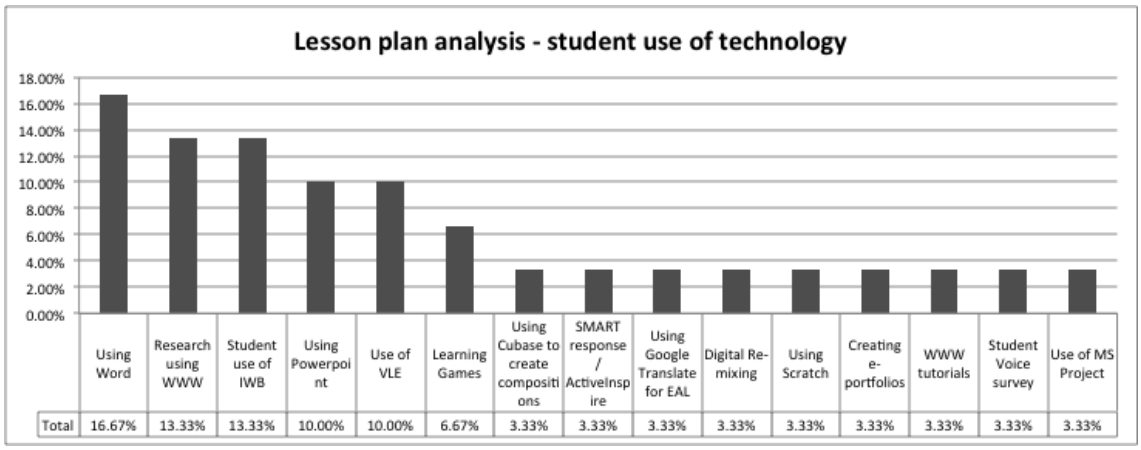


Figure 13: Lesson plan analysis – student-led use of ICT

Using this data, it can be seen in figure 12 that planned ICT activities were more likely to be teacher-led. This is supported by Liu (2011) and Ertmer et al (2012) who also found that ICT use is often teacher-led.

As is shown in figure 12, the use of technology for teaching shown in this example of lesson planning is characterized by using:

- Interactive Whiteboard (IWB) / PowerPoint to transmit information.
- Videos, imagery or music to explain concepts,
- Digital timer tools, including playing music to time activities,

The data from the lesson planning analysis demonstrates the use of technology to present information to students as the main function of technology within the school. This was also highlighted by almost all staff during the interview process, and in a number of questionnaire responses, illustrated below.

> *"I use ICT to plan my lessons. All lessons have some form of IWB or a PowerPoint presentation. I am trying to imbed Smart Response [voting pads] so I can use them as a starter activity. YouTube clips or DVDs are used regularly to enhance and clarify information presented to students" (Teacher questionnaire response).*
>
> *"All lessons have full PowerPoint or Smart Board presentations to go alongside teaching, with key information/diagrams, links to activities, videos etc." (Teacher questionnaire response).*
>
> *"I often take a multi-modal approach in the lessons using images, film clips, songs etc. in order to engage the learners. I also make use of the interactive whiteboard for starter activities and find it particularly useful for the annotation of poems with my AS class" (Teacher questionnaire response).*
>
> *"I use PowerPoint to present information and show relevant video clips" (Teacher questionnaire response – DT).*
>
> *"It provides the "hooks" in the lessons, to get the pupils engaged; this could be sounds, music, video" (Teacher questionnaire response – Maths).*

The lesson plan analysis, questionnaire and interview data show that the IWB is used primarily as a display tool and to aid presentation. This is supported by a number of authors (Liang et al, 2012; Slay et al, 2008; Twiner et al, 2010; Henessy et al, 2007; Heemskerk et al, 2014) who identify the prevalence of use of IWBs and their use to present media-rich content to students. Teachers above explain how this enables them

to explain concepts more clearly to students using diagrams, videos, photos, other visual content and sound, and allows the teacher to prepare these materials in advance, and to reuse them.

While staff feel that using ICT to present information makes this more accessible to students, some members of staff are critical of the use of IWBs in terms of the level of interactivity by students. This lack of student-use of IWBs was also highlighted by Türel (2011).

> *"I use it [IWB] for presenting and sometimes interactively. I do not use it as much as other people do as I don't think that something that is billed as being interactive is interactive if only one person in the class can use it at a time. It's a fantastic resource but only one person can use it interactively" (Teacher F, Science).*

Although the lesson plans detail teachers' planned use of technology within lesson time, they do not cover teachers' use of ICT to support teaching in terms of administrative tasks such as working with data or producing resources to use within their lessons. However, these uses are also important to teachers, as is evidenced through interview data.

> *"We are able to quite easily track progress of Key Stage 4 students through the use of a range of the VLE tools and the established monitoring systems we have built in. We are able to easily analyze data very quickly which means we can focus on individuals and specific groups and track progress over the whole school" (Teacher G, ICT).*

> *"I couldn't live without ICT, creating resources is so much easier and they are easily edited for new classes to ensure differentiated scheme of work. ICT allows me to analyze in detail, modelling language analysis for the group and allows interactivity, sharing ideas and providing hints/questions easily as a backup when pupils struggle. I use the IWB every lesson" (Teacher questionnaire response, English).*

The use of ICT for administration tasks and presenting information to students is widespread across the school in this study, as was found within other studies (Lim & Barnes, 2002; Windschitl & Sahl, 2002; Reedy, 2008). Analysis of teacher questionnaire responses showed that 92% of teachers identified that they use ICT to support their lesson planning on a regular basis and 80% of teachers identified that they often use ICT to track pupil progress. However, the use of ICT to analyze formative and summative assessment data was less prevalent, with 58% of staff reporting that they do this 'often', suggesting that teacher-use of ICT can also be developed.

However, there are tensions between the SLT and teaching staff in terms of whether the use of ICT is used to support teacher-led or student-led teaching and learning. Some teachers stated, through questionnaire responses, that they saw the use of ICT by some staff as reinforcing what they saw as 'poor' teaching.

> *"ICT, when used effectively, can generate increased pace, challenge, engagement and variety to learning. Too often, however, 'PowerPoints' are used to aid 'chalk and talk' or 'poor' teaching" (Teacher questionnaire response).*

This suggests that 'chalk and talk' is seen here as synonymous with 'poor' teaching. Whereas, for some SLT members, there is an assumption that if staff are using ICT then they will not be doing 'chalk and talk'.

> *"ICT is now embedded in teaching and learning in the sense that everybody now has to use some form of ICT in lessons. This was not the case previously but we have really moved on from the 'chalk and talk' model of teaching" (SLT B).*

This is perhaps in contrast with Henessy et al (2007) and Liang et al (2012) who identify that often IWB use can be used for teacher-led instruction albeit with the addition of multimedia content.

This section has identified tensions between how teachers make use of ICT to support teaching and the SLT vision for *effective use of ICT*. Lesson planning statistics, supported by teacher interview and questionnaire data identify that ICT use is mainly

teacher led, whereas the SLT vision for the use of ICT promotes student-led uses as desirable.

6.2.2 Supporting Learning

While the section above showed that ICT use to support teaching is broadly consistent across the school, particularly in terms of presenting information to students and supporting lesson planning, this section shows that ICT to support learning exhibits variation within and between departments. Within the lesson plans sampled, where there was planned use of ICT by students, this showed a greater range of activities (figure 13). These activities include preparing reports or presentations using Microsoft Office software, along with using the VLE and other online tools such as learning games. Considering departmental differences, ICT, English, SEN, music and DT identified comparatively higher planned uses of ICT by students. In terms of the desirable use of ICT as articulated by the SLT, student-use should perhaps be greater than that seen here.

Through the adoption of the Teacher Effectiveness Enhancement Programme (TEEP) lesson planning process within the school's teaching and learning policy, the SLT have identified the desirability of student-centred pedagogy. Within the TEEP literature, collaborative learning and constructivist pedagogy is promoted. Some staff endeavour to make wide use of technology to support learning, supporting the vision of the SLT in terms of student-centred uses of ICT and constructivist pedagogy.

> *"Students make use of laptops for research and presentation tasks and to collate data in experiments for analysis. Students also use cameras or their mobile phone cameras to film reports, experiments and other types of activities and use movie-editing software to model experiment mechanisms at A level. I encourage them to make use of the VLE to support independent learning at home. I make use of the IWB to present new information, for self-assessment and reviewing learning. I use the Visualizer to display work and show close up views of experiments;" (Teacher questionnaire response, Science).*

"Students use ICT for creative tasks such as setting up a blog page and creating videos and playing educational games" (Teacher questionnaire response – MFL)

A use of ICT highlighted in the *construct meaning* and *apply to demonstrate* sections of the TEEP cycle (Ragbir-Day et al, 2008) and seen within the school is the creation of multimedia artefacts whereby students develop and show understanding through this production. Students themselves identify the making of artwork, video, animation and sounds, particularly in conjunction with working collaboratively, as activities they enjoy and value in terms of their learning.

"I think using ICT is about having fun doing, for example, creating games and animations. Bringing your own life, to life" (Student G).

"I like using ICT to make animations, games and creating new things" (Student questionnaire response)

"When you are making something with ICT, you learn more than just researching a topic" (Interview response, Student F)

These responses show that students have expectations of education in terms of entertainment. The idea that education and entertainment are linked and that 'enjoyable learning' is important is supported by Resnick (2004), Madej (2003), Gee (2007) and Murray (2006). Resnick (2004) gives the example of museums where interactive exhibits are developed to engage visitors (Wishart & Triggs, 2010). Gee (2007) and Murray (2006) identify the learning potential of computer games, where students can be particularly engaged in these activities. However, Okan (2003), Craig & Amernic (2006) and Hill et al (2012) state that entertainment detracts from learning where students may be motivated to use computers but not to learn.

Students went on to clarify that, while they enjoy and value these activities, not all subjects provide this kind of ICT experience.

"We'd like to use the new programs; we're still using Microsoft Office even though we have all these new, more interesting programs" (Interview response, Student D)

"We have new computers but the work isn't better, we still do the same things with the computer – research, Word and PowerPoint" (Interview response, Student F).

Through questionnaire data, both students and staff identified that the creation of artwork, animations, videos and sound did not occur on a regular basis, with 45% of staff identifying this type of tasks as undertaken often or sometimes. In considering which teachers or departments do make use of ICT for games and animations, for example, this again includes differences within and between departments whereby departmental differences do not explain this variation.

Analysis of teacher questionnaire data suggests that using ICT for student-centred tasks is associated with teachers having a high degree of confidence in their own ICT skills, as shown in figure 14. Staff confidence with ICT was measured through a series of questions where staff rated their ability to complete a number of ICT based tasks. These results were combined to give an overall measure of confidence and staff grouped into very confident, confident, moderately confident and limited confidence.

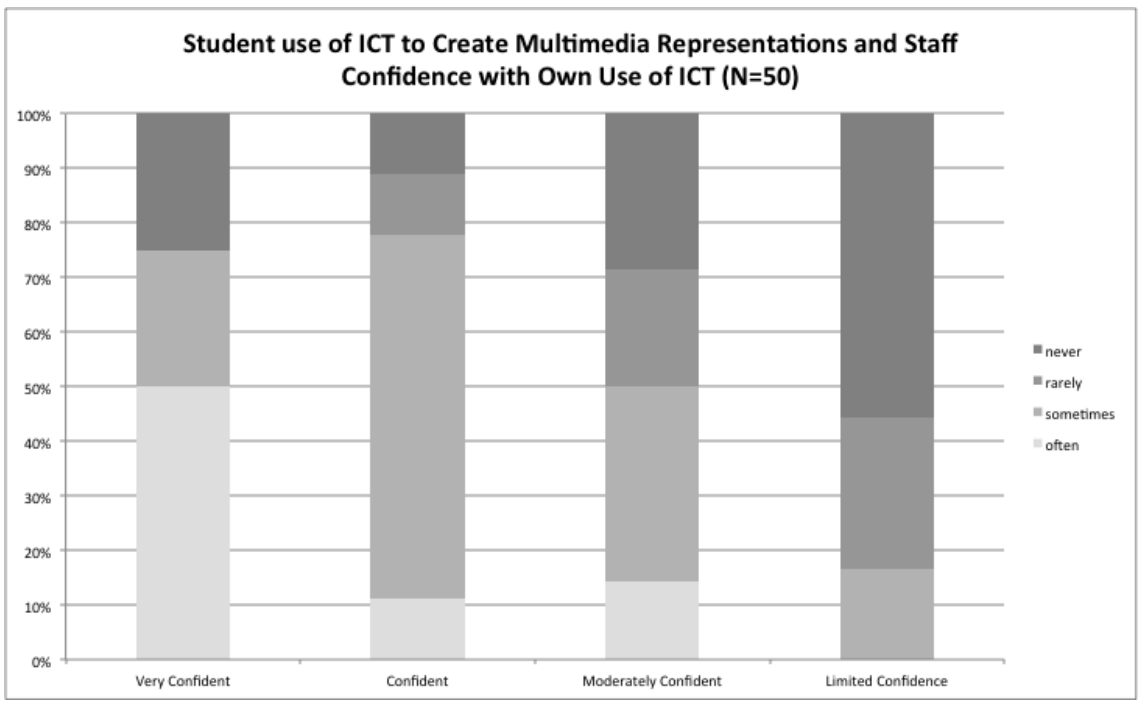


Figure 14: Student use of ICT to create multimedia representations and staff confidence in own use of ICT

Confidence in own use of ICT is also identified by a number of authors in terms of how teacher-beliefs affect ICT use (Loveless, 2003; Ertmer & Ottenbreit-Leftwich, 2010). This implies that Continuing Professional Development (CPD) is important here to develop this across the school and will be addressed within recommendations in chapter 7.

6.2.3 Summary

This section considered how ICT is used across the curriculum to support teaching and learning and shows that, despite the SLT vision for student-centred uses of ICT, the main uses of ICT are in fact teacher-led. In addition, there is evidence in terms of lesson plans, interview and questionnaire data that suggest that there is variation within and between departments in terms of how ICT is used. One factor affecting this variability is that of teacher confidence in their own ICT ability, indicating that CPD is important as discussed in chapter 5 and within recommendations in chapter 7.

6.3 USE OF THE VLE

The research aims of this study include a focus on the use of the VLE, including how and why the VLE is used and not used by students, teachers and parents. The VLE has available functionality to create sections for each department in school, divided into 'courses' within each subject. These 'courses' are individual webpages that contain a variety of materials added by teachers to support students' learning. Course content added by teachers may be static resources, such as links to other websites or worksheets for students to download, but may also include interactive and collaborative activities such as forums, blogs, wikis, games and mind-maps. The VLE also supports document submission for students, that can then be manually graded and feedback given to students by the teacher and quizzes, where the teacher adds the content but the responses are automatically graded by the software itself. As previously mentioned, use of the VLE to support homework and bridge the home-school divide has been identified as desirable by the SLT.

It will be shown that, while some teachers and students do make use of the VLE for a variety of tasks, other teachers and students do not and parental use of the VLE is minimal. In addition, in identifying when the VLE is used, it will be shown that most activity occurs during school hours, contrary to the SLT view of desirable use to bridge the home-school divide.

6.3.1 How the VLE is Used

While the interactive and collaborative functionality offered by the VLE more closely fits with the TEEP lesson planning cycle requirements, this section uses VLE log data to show that these functions have limited use and the majority of VLE use in the school here is for hosting static content such as worksheets. However, data from student and staff questionnaires and interviews illustrate how this functionality is seen to aid learning by providing support materials and extension tasks for student to access independently. In addition, the use of the VLE for homework is considered, where it will be shown that some students and teachers find that the VLE can support homework administration. However, in terms of the time of day for VLE actions, the VLE is mainly used in school time. It will be shown that VLE use is variable and section 6.3.2 describes further who uses the VLE.

VLE log data, collected over three weeks across two years was collated and analyzed to produce descriptive statistics of use, shown below.

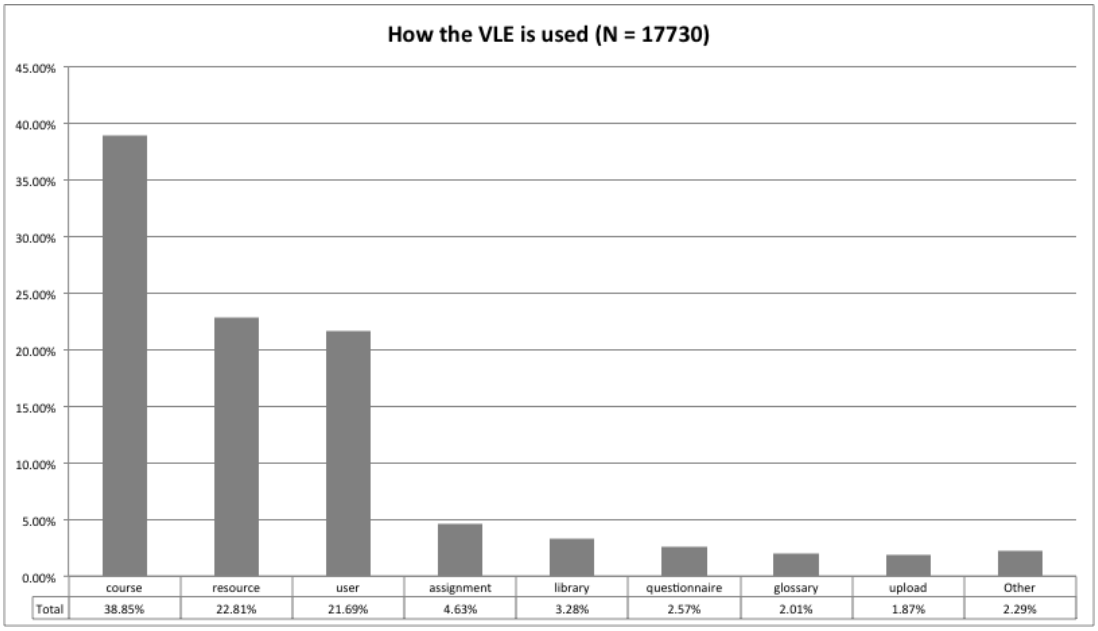


Figure 15: How the VLE was used over three representative weeks

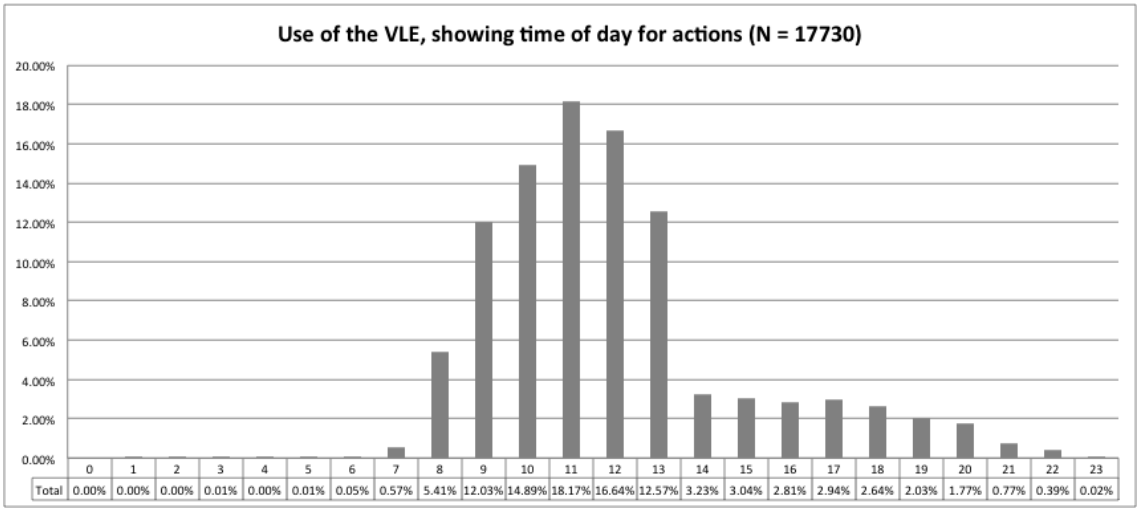
Figure 15 highlights the distribution of VLE usage. As can be seen, this is mostly for:

- Course actions: such as creation and viewing of courses. A course is a section of the overall VLE usually related to one unit of study;
- Resource actions: adding and viewing of files or static content such as Word document worksheets, links to other web resources or PowerPoint presentations added by the teacher to be used by the student;
- User actions: such as logging in, changing profile picture or adding profile details.

There is some use of interactive content such as glossaries, forums and assignments but with very limited use of games and collaborative mind-maps. This distribution of activities is similar to that recorded by Jennings (2005), whose study of VLE use in a university found that sharing of static resources such as worksheets was of value to students but it is often overlooked when focussing on the use of collaborative tools. However, the TEEP identification of *effective use of ICT* and focus on constructivist and collaborative learning suggests that use of the VLE for these collaborative tasks is more

desirable and it is therefore interesting to note that access to lesson resources continues to be the primary use of the school's VLE. This links with the lesson plan analysis data presented above in figures 12 and 13, where a small number of planned activities for students made use of the VLE.

Hsu (2011) and Deepwell & Malik (2008) emphasize the importance of the role of the teacher in developing activities for students for use in and out of the classroom and so it is interesting to note in figure 16 the distribution of VLE use between school hours and outside school hours.



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Total	0.00%	0.00%	0.00%	0.01%	0.00%	0.01%	0.05%	0.57%	5.41%	12.03%	14.89%	18.17%	16.64%	12.57%	3.23%	3.04%	2.81%	2.94%	2.64%	2.03%	1.77%	0.77%	0.39%	0.02%

Figure 16: Use of the VLE, showing time of day for all actions

This distribution is approximately 80% to 20% in favour of school use and yet one of the key aspects of the VLE in terms of the literature and rationale for development within this school is its use for extending learning beyond the school day (Becta, 2009). As can be seen in figure 16, whilst there appears to be some use across all times of day, this is concentrated mainly within formal school hours, indicating that the VLE is used primarily to support learning within school. This is contradictory to the idea of 'anywhere, anytime learning'. It would appear from this data that this is an issue to be addressed, if the SLT vision of use of the VLE to bridge the home-school divide is to be implemented.

In conclusion, the VLE use is variable and this is reflected in log data and supported by questionnaire and interview responses from students and teachers. Predominantly the VLE is used as a content repository, but some teachers and students are

investigating other uses that meet the SLT aims for student-centred learning. The following section looks in more detail at who uses the VLE.

6.3.2 Who Uses the VLE

In the previous section, VLE log data showed that VLE use was variable and this section investigates further who makes use of the VLE. It will be shown that while the majority of students do make use of the VLE, their views of it are mixed. In terms of teacher use, less than half of the staff in the school used the VLE in the time sampled, however some teachers are high users and departmental variation will be considered. It will be shown that the majority of VLE use involves the ICT department.

The VLE log data shows that in total 1047 of 1411 potential users accessed the VLE with over 17500 separate actions performed.

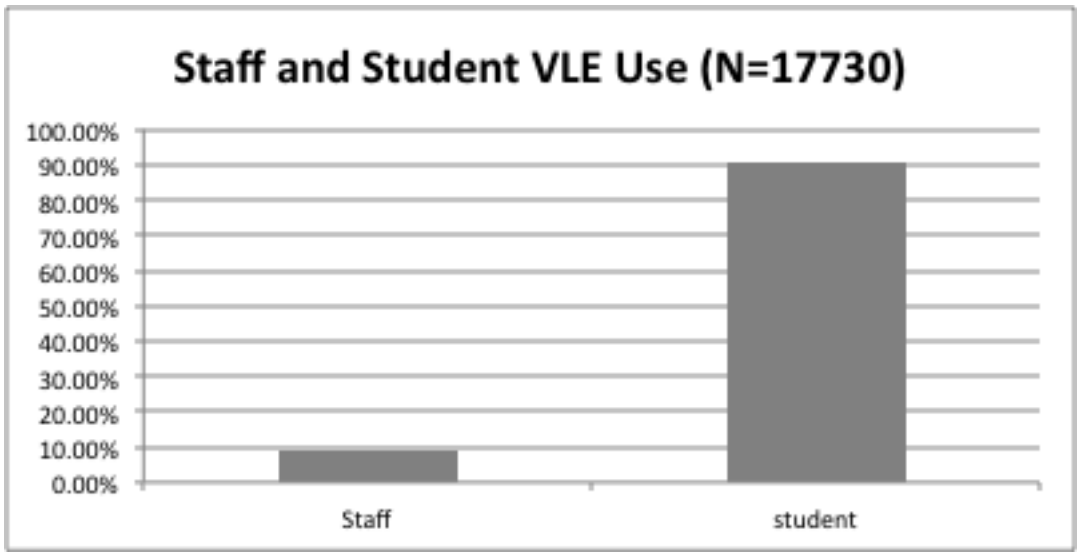


Figure 17: Staff and student VLE use

The majority of usage was by students, as illustrated in figure 17 above. Within this time, approximately 80% of students within the school used the VLE while only 40% of staff users were represented. There was no activity from parents or other users, however 27% of parents identified through questionnaire data that they use the VLE with their child often or sometimes.

In terms of individual usage, the top ten most active users during this time, accounting for 10% of the total VLE use, were evenly split between students and staff, showing

that some students are making considerable use of the VLE. However, as is shown in figure 18 below, whilst a narrow majority of students do find the VLE helps them to learn; a large percentage of students are ambivalent towards the use of the VLE, and a minority find that it does not help them learn.

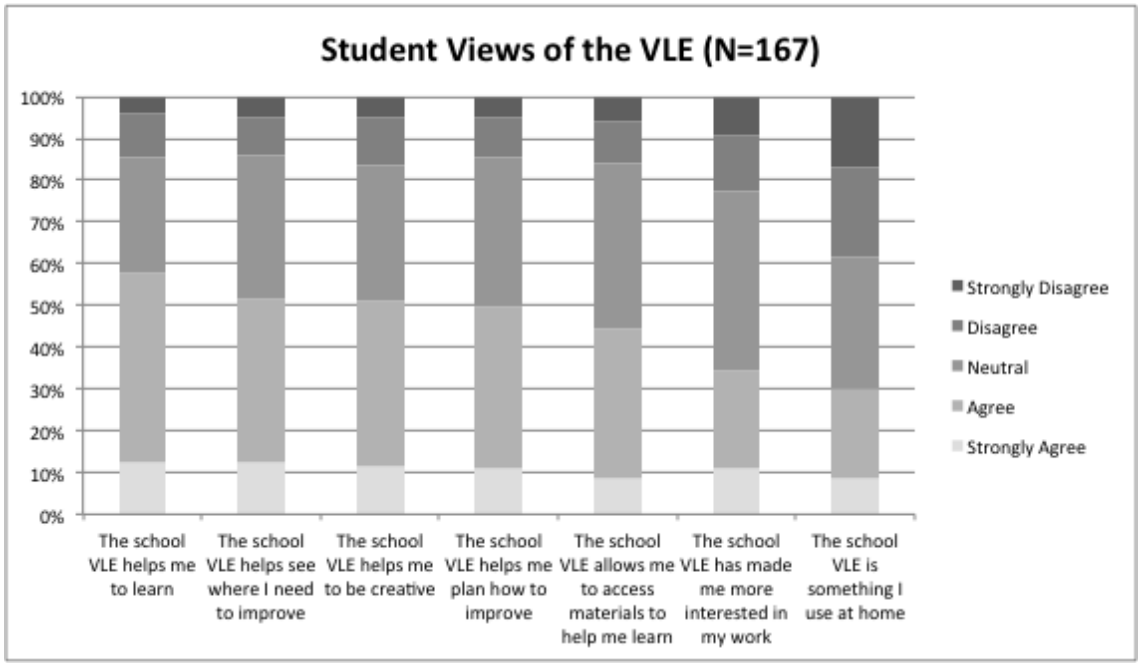


Figure 18: Student views of the VLE

Students identified that they make use of the VLE when directed to by their teachers therefore teacher use and non-use of the VLE is important to understand.

How frequently staff make use of the VLE (N=43)	Number	Percentage
Often	8	18.6
Sometimes	12	27.9
Rarely	10	23.3
Never	13	30.2

Table 19: How frequently staff make use of the VLE

Table 19, outlining the staff questionnaire responses relating to how frequently they make use of the VLE, shows that over half the staff rarely or never use the VLE and is supported by VLE usage statistics given above. A significant indicator identified within the research is that of subject specialism. Figure 19 below, shows that the ICT department makes more use of the VLE than other departments. In addition to making more use of the VLE overall, the ICT department also make use of a greater

range of VLE activities including the use of interactive, collaborative activities such as discussion forums, blogs and collaborative mindmap tools.

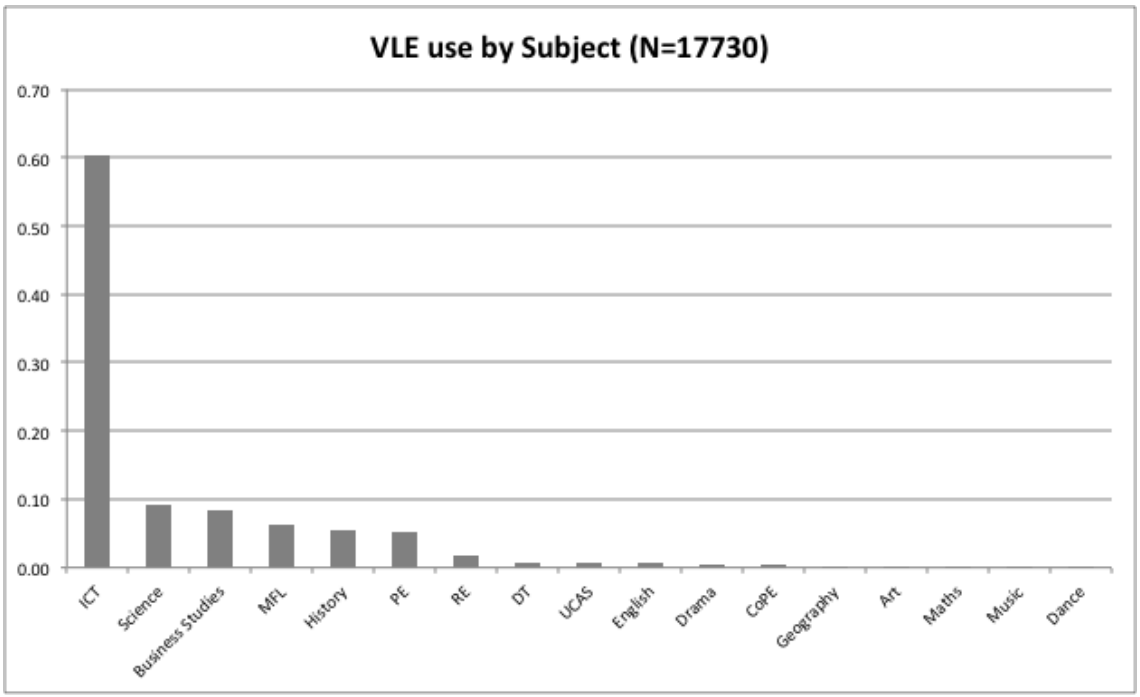


Figure 19: Departmental use of the VLE

This is supported by student views of how they make use of the VLE in different subjects, identified through questionnaire data. However, when considering the wider use of ICT it has been shown that the Music department makes good use of other technologies to support teaching and learning (Wise et al, 2011). This therefore shows that within and between subjects there exist differences in which technologies are used and how they are used (Erixon, 2010; Hennessey et al, 2005; Prestridge, 2012).

The five members of staff making highest use within the time sampled represented ICT, science, geography and business studies departments. Through interview, these teachers explained their VLE use further. The use of blog entries are an element of assessment within ICT and are used by ICT staff to assess pupil progress within Key Stage 3. As is stated above, use of the VLE is high within the ICT department; taking into account this enforced blog usage and excluding this from the statistics still places ICT staff members amongst those staff making highest use of the VLE within the time sampled.

"I use the VLE for all of my resources and for every course I teach there is a VLE course. Students use the VLE to record blog entries of the objectives and their progress. They also submit work and we give feedback to students via the VLE as well. In terms of blog entries, that's quite useful as you have a record of their blog entries over time and see a record of what they've done and how they've progressed" (Teacher N, ICT).

While Business Studies teachers and students make use of the VLE, this use is not reflected in questionnaire and interview data from students, due to their age at the time of data collection they were yet to start GCSE courses.

"I use the VLE to share resources and upload teaching resources. Students use the mind maps, blogs and forums to record progress and share ideas" (Teacher R, Business Studies).

Within science, variation within the department indicates that under half of the teachers make use of the VLE and therefore not all students use these facilities within their science lessons, as was highlighted earlier in that students make use of the VLE when directed by their teacher.

"At present, the VLE is used for sharing resources between staff, sharing assessment with students and using it for peer assessments. I have started using it for web quests and I used to do student voice surveys on there and for the older students, I encourage them to use the forums to collaborate and share problems" (Teacher F, Science).

"Using VLE we can talk to our other classmates and share our work. This helps us get different ideas" (Student questionnaire response).

"We used [forums] for science, I could ask my friend if I got stuck or something and they could write up their sheet on there" (Student E).

However, the quotes from students and teachers above suggest that those who use the VLE, value its use to support teaching and learning. It is interesting to consider reasons for non-use of the VLE, as described further below.

6.3.3 Non-use of the VLE

As stated above, while some teachers use the VLE frequently, over half of the staff in the school did not use the VLE in the weeks sampled. This section discusses reasons for non-use illustrated by teachers through questionnaire and interview. It will be shown that, while a number of other web services are used in place of the VLE, for some teachers the VLE is seen as not being suitable to meet the needs of students. In terms of student non-use, one aspect limiting use as explained by students through interview here was that of the user interface.

In addition to the VLE, the school uses a number of other web services such as MyMaths, GCSEPortal and IAmLearning. It can be seen from the data that these other services have affected how the VLE is used. For example, a number of different departments related how they provide opportunities for setting homework and therefore did not need to use the VLE for this.

> *"I do not use the VLE as much as I should. We use it for uploading information about exams, revision and so on. For the homework that we do, we have a software program online [IAmLearning] and in other cases its specialized kind of homework where we are going for more creativity to engage the pupils and get them to want to do the subject and the homework and the VLE, in my opinion, it's too restrictive in that sense" (Teacher L, MFL).*

> *"At home they use MyMaths so they do their homework all online and we teach with a little bit of MyMaths as well. We use the VLE, especially at GCSE time, for easy access to all the past papers" (Teacher H, Maths).*

The responses noted here, that the VLE was not suitable for the taught curriculum and that the software was not suitable to meet the needs of the specific students they teach, were also raised in relation to students with special educational needs.

> *"[I haven't used the VLE] because the curriculum I use isn't on the VLE; I haven't put anything on there. The students I work with I could imagine aren't the most active on the VLE either" (Teacher C, Learning Support).*

The suggestion that the VLE may not be suitable for the students within the school, or may not fit in with the curriculum, is also supported by a number of other authors (Leidner & Jarvenpaar, 1995; Leigh, 2010; Habib & Sønneland, 2010; Maltby & Mackie, 2009). Leidner and Jarvenpaar (1995) state the need for users to show maturity and motivation in using VLEs to support learning. Maltby & Mackie (2009) identify groups of students in terms of their VLE use and academic performance and find that, for 'disengaged' students who show low VLE usage and low performance, rather than being of benefit for students, the VLE may cause these students to fall further behind due to their non-use of these services.

In addition to developments in available web based technology and the progress of the school's 'learning platform'; many apps and devices now allow the ability for users to easily customize the visual appearance of web based services and user interfaces. Students are used to having this functionality of their own devices and their questionnaire and interview responses highlight the lack of visual appeal of the VLE and lack of customization available in the e-portfolio module, as discussed further in section 6.4.2. Students see this as a negative feature and even give suggestions for improvement.

> *"The VLE's front page is plain, simple and a little bit boring. To make it look better we could put the subjects in their own little box and then add pictures from trips, pictures of good work and so on" (Student D).*

> *"…change the theme regularly; maybe for special events, like Google does" (Student A).*

Again, this links to the idea that students expect education to be entertaining, as highlighted above. Inkpen (1997) agrees with the students' views on the importance of the user interface and explains that students' motivation for using software, in this case the VLE, is not the same as that of teachers. Inkpen (1997) goes on to explain that whereas teachers are using the VLE to accomplish a work based task, and therefore are motivated by task completion, students are often directed to use the VLE by teachers and are therefore more motivated by enjoyment of the task. This is

explained (Inkpen, 1997; Bower, 2011) in terms of human-computer interaction (HCI) and multimedia design theory, where the design of the user interface can be of benefit in motivating students. Inkpen (1997) and Bower (2011) describe environments that are attractive to students in terms of layout and functionality, particularly those that allow for collaboration and customization and those that also offer audio elements. Luik (2011) explains that the user interface affects learning in terms of presentation of information and, in particular, that while students may suggest that they like a variety of colours, it is not necessarily beneficial for learning.

6.3.4 Summary

The SLT vision for use of ICT to support teaching and learning identifies student-centred uses of ICT as desirable. However, this section has shown that within the school the VLE is mainly used to host static content such as worksheets and teacher presentations but that this use is valued by both teachers and students. Some teachers make wider use of the VLE, including making use of collaborative and creative tools, supporting the SLT vision and are positive about the use of the VLE to support teaching and learning. The SLT also identify the need for the school to develop the use of the VLE to support homework but it has been shown that the majority of VLE use takes place during school time. In terms of recommendations arising from the study, the role of the ICT department in supporting VLE development across the school is identified and will be addressed in chapter 7.

6.4 Introduction of E-Portfolios for Assessment of Key Stage 3 ICT

The e-portfolio module was a third party add-in for the Moodle VLE provided by Exabis and allowed users to create a navigation structure, link files from their VLE account, upload other files and create weblinks then share their e-portfolio with other users of their choice, to encourage feedback and reflection on learning. The aim of these e-portfolios was to enable the assessment of end of Key Stage 3 ICT to encompass ICT learning within discrete ICT lessons, across the curriculum and at home. The e-portfolio system was also expected to enable students to reflect on their learning and engage further with their assessment. Students were introduced to the e-portfolio

system in ICT lessons and encouraged to add evidence throughout the year. Time was set-aside during the year for e-portfolio development. However, it will be shown that the e-portfolio system was not implemented successfully for all students, as technical problems in terms of ease of use caused difficulties for some students.

6.4.1 Use of E-portfolios

Students were guided to create their e-portfolios within ICT lessons. In line with assessment in ICT, students were asked to include their 'best' work to evidence three strands of assessment: presenting information, analysing data and sequencing instructions. Students were advised on which types of document would provide evidence for each strand but students worked independently to choose the files they added. The e-portfolio attachments were analyzed both in terms of the type of software used to create them, and the subject content, as shown in figures 20 and 21. Some issues with the software used were encountered in terms of identifying links to external websites, as will be further described on section 6.4.2.

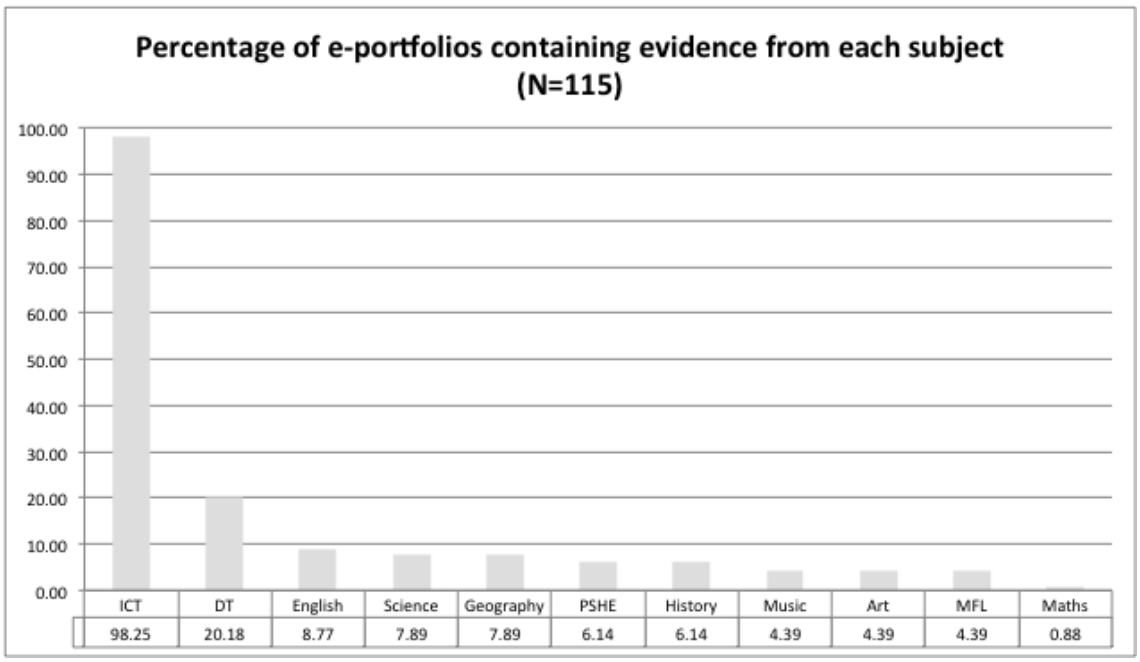


Figure 20: E-portfolio contents by subject

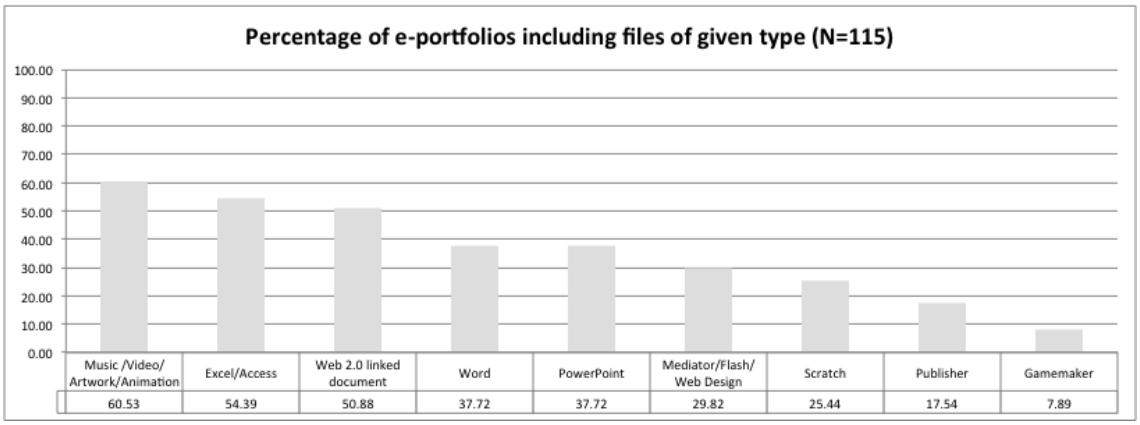


Figure 21: E-portfolio contents by file type

As can be seen in figure 20, 98% of e-portfolios contained evidence created as part of the students' ICT lessons. Other subjects were less well represented whilst some were not covered at all. For example, use of ICT in maths appears here to be limited whereas, in fact, this related to the maths department use of other tools such as the web service 'MyMaths' that could not be included in the e-portfolios due to technical limitations.

When analysing the data in terms of types of document included, some e-portfolios contained only one type of document, whilst some contained a variety. Figure 21, shows the percentage of e-portfolios that contained at least one file of the given types. As can be seen, music, artwork, animations and videos were the most common showing that students value this type of activity for presenting information over that of PowerPoint. As identified above, the use of PowerPoint is comparatively much higher than that of multimedia creation and therefore in choosing multimedia presentations rather than PowerPoint to be included within their e-portfolio, this demonstrates the value students place on this kind of activity.

The creation of artwork, music, movies and animations takes place in a number of departments as was identified through observation data and supported by interview and questionnaire data. As has been highlighted previously, students identify creating animations, for example, as an activity that they enjoy and that supports their learning in various subjects. A high proportion of e-portfolios included work created in Excel or Access, but this may be explained by the content of the ICT curriculum and the high percentage of e-portfolios containing work from ICT. The data appears to support the

teachers' strategy of encouraging students to make use of PowerPoint and Word, in that students also chose to incorporate this into their e-portfolios.

In terms of creating and using e-portfolios within ICT lessons, students were asked to include in their e-portfolio what they saw as their 'best' work. For some students this was motivational, as illustrated by the quotes below.

> *"I have used my e-portfolio to store my best work. I decided what to put into my e-portfolio by putting the best pieces into it and the things I enjoy" (Student questionnaire response).*
>
> *"I chose to put these items into my e-portfolio as I see it as my best work and it shows different things from all aspects of ICT" (Student questionnaire response).*
>
> *"I have used my e-portfolio to show what I have learnt and for teachers to mark my work. I decided to use work that I was most proud of and I also wrote whether it was tricky or easy" (Student questionnaire response).*
>
> *"I have used my e-portfolio to present, display and organize my work. My e-portfolio includes my best work to be submitted to teachers" (Student questionnaire response).*

However, for some students the idea of '*best*' work appears to have been a limiting factor in what they added, as noted when analysing the contents of the e-portfolios, as there was a marked difference in the contents from different students. This is shown by some students only including one or two items, whereas other students included over fifteen. Despite these differences, the contents of the e-portfolios were analyzed in terms of the types of document included and the range of subjects represented. Students reported that they mainly included work from ICT lessons and raised issues during ICT lessons devoted to e-portfolio development in terms of how they made decisions about which work to include where the emphasis on *best work* caused them problems.

The issues students had with self-perception of their 'best' work and work they were 'proud' of are interesting here in terms of the use of e-portfolio development and how

student perceptions in fact limited their use of this software. Issues arising from the inclusion of 'best work' were also identified by Marriot & Chomba (2010) in their work with undergraduate computing students.

A number of authors identify benefits of e-portfolios in terms of developing students' self-assessment skills (Boud, 1995; Andrade & Du, 2007; Nicol & McFarlane-Dick, 2006). Self-assessment skills are seen as beneficial for learning (Black & Wiliam, 1998). However, the quotes from students suggest that, in finding identifying their 'best work' difficult, self-assessment skills need further development. Arter & Spandel (1992) Andrade & Valtcheva (2009) and Hanrahan & Isaacs (2011) all suggest that students' self-assessment skills are improved where there are clear teacher guidelines and assessment criteria for students but that these skills take time for development. Feedback, from peers or teachers, is viewed as helpful in developing self-assessment skills (Nicol & McFarlane-Dick, 2006). Here, perhaps due to technical difficulties with the e-portfolio management system taking time away from student-reflection and limiting peer-feedback, students did not have time to develop self-assessment skills and therefore found identifying their 'best work' difficult.

6.4.2 Failure of E-portfolios

As stated above, the research aims included making use of e-portfolios to assess students' end of Key Stage 3 performance in ICT. However, the use of this VLE module for e-portfolio development was not fully successful, as further issues arose and difficulties were encountered that meant that universal use for the cohort was not achieved. As shown below, while some students made use of the software, difficulties were encountered with the user interface, students' ability to share work for feedback and aesthetic appearance of the final e-portfolio.

Through observation and interview data, ICT staff were positive about the use of e-portfolios for *some* students in terms of evaluating their work and developing their understanding

"In terms of being able to collect their work together and evaluate their progress, it was good for the student's it worked for in terms of them being able to see their progress and make links between ideas" (Teacher G, ICT).

In further discussion with ICT teaching staff, where students used e-portfolios to present and evaluate their work, this practice was seen as effective and in terms of student views of e-portfolio use, a small majority found them useful in terms of developing understanding, knowing how to progress and presenting their work as can be seen in figure 22.

As with more general use of the VLE, there are a number of groups of students identified through data analysis in terms of reasons for non-use of e-portfolios. Similar themes arise here in terms of time and functionality issues as will be described below. While students appear broadly positive about the use of e-portfolios to present their work and how this allows them to identify areas for improvement, they are split almost evenly on the learning potential (shown below in figure 22).

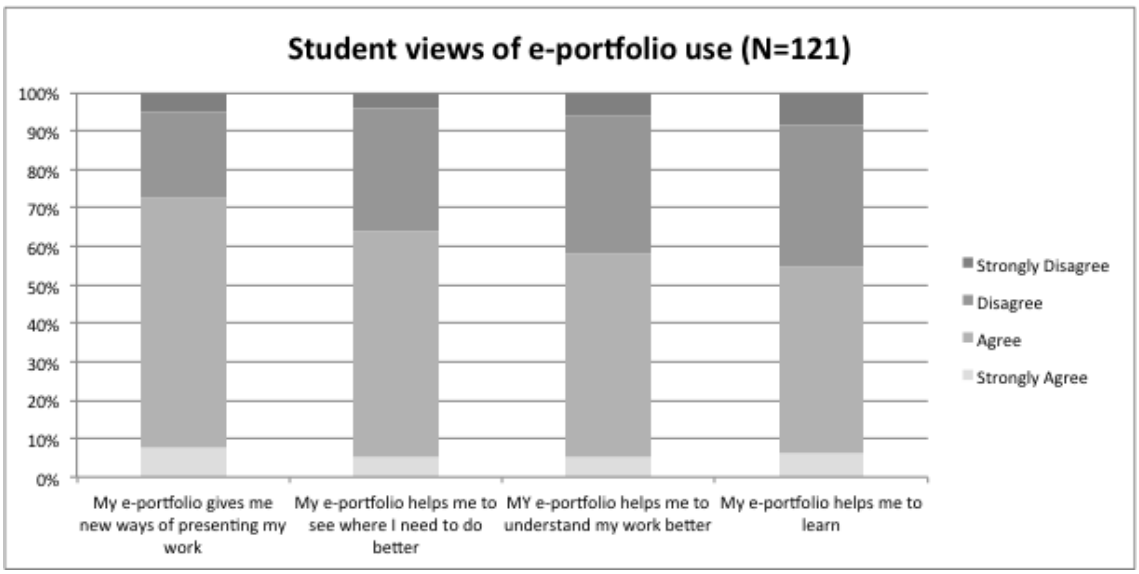


Figure 22: Student views of e-portfolio use

As the quotes below show, students found the e-portfolio software used limiting in terms of the customization available and the technical capabilities. While this may be down to the software chosen, this raises issues in terms of the suitability of e-portfolios in this application.

> *"The weaknesses of e-portfolios are it can be boring to look at and you are limited in what you can add in. We could customize it to make it more personal and attractive" (Student questionnaire response).*

With respect to teacher views of the use of e-portfolios, the issues raised by students were confirmed in terms of the limitations of the software chosen and, in particular, its lack of customization and ease of use.

> *"Most of the problems revolved around the fact that it was quite complicated in terms of the user interface within Moodle. There were lots of technical problems, particularly to do with sharing e-portfolios and lots of students found this difficult. Only the Able, Gifted and Talented students managed to enable this sharing aspect. Others simply looked at the screens to provide reviews" (Teacher G, ICT)*

This corresponds with the finding of Newhouse (2011), who found that online e-portfolio management software was required to deal with technical issues arising and Le & Lin (2010) in terms of the importance of students' understanding of how to use the e-portfolio system. In addition to the visual appeal of the user interface, the importance of ease of use was also raised by students during ICT lessons observed here and is discussed by a number of authors (Cho et al, 2009; Garrett, 2011). It was found here that the e-portfolio module chosen had some weaknesses in its user interface design; it was somewhat counter-intuitive in terms of how to set up e-portfolio sharing and did not allow for customization of layout, appearance and presentation of attachments. This links with Inkpen (1997) and Bower (2011) in terms of the importance of aesthetics for learners as described above. These weaknesses may have affected how the students made use of it as sharing and feedback on work was limited to verbal discussion with others present rather than allowing for asynchronous feedback. These weaknesses in terms of lack of customization are also supported in the opinions of Cho et al (2009) and Garrett (2011) on how user interface design affect e-learning acceptance.

6.4.3 Summary

One aim of this study involved the construction of e-portfolio by students in order to facilitate end of Key Stage 3 assessment in ICT. This section has shown that, despite engagement from students and staff, the e-portfolio system was unsuccessful and recommendations will discuss the need to consider the fitness for purpose of the technology. In particular, the use of the VLE based e-portfolio to encourage sharing and feedback between students was not successfully implemented. Within e-portfolio creation, it is interesting to note issues raised by students when considering their *best work* in fact limited their use of the software. While some students, through questionnaire data, reported that they found e-portfolio creation useful in terms of presenting their work and knowing how to improve, many students did not agree with these statements. Both teachers and students found the user interface difficult and many students were concerned with the lack of customization options available to them, as has been described above in terms of the effect of user interface on e-learning acceptance (Inkpen, 1997; Bower, 2011).

6.5 Student Perceptions of ICT Use

One aspect of the use of ICT identified by the SLT as important is that of bridging the home-school divide, for example using the VLE. It is important to consider how students' make use of ICT outside the school and how this relates to their learning in school. It will be shown that, while the majority of students have access to devices and the internet, students make use of this technology in different ways but for most students, use of the VLE is low. The variation in student use of the internet at home is investigated using the classifications of Eynon and Malmberg (2011) in their study of student technology use. It will be shown through the analysis of questionnaire data, that while some students make wide and varied use of the internet at home, others do not and this has implications for the school in terms of the teaching of digital literacy skills.

In addition, how teachers perceive students' home use of technology can affect how teachers choose to make use of ICT to support teaching and learning. It will be shown

that teachers who view students' home use of ICT as contributing to their learning in school are more likely to make use of ICT in student-centred ways. This is particularly interesting to note, as current literature does not highlight this as a significant belief affecting classroom practice.

6.5.1 How Students Make Use of ICT at Home

As described in chapter 4, all Year 9 students were invited to complete online questionnaires. In terms of students' access to ICT outside of school, students were asked whether they had access to a computer outside of school, and whether they had internet access either via the computer or any other device such as mobile phones. In order to account for data anomalies, which may occur in a snapshot questionnaire, students were asked three times throughout the year and results averaged.

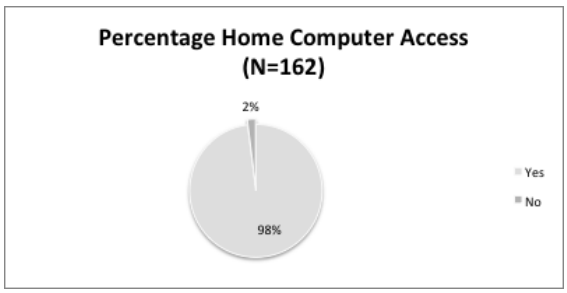


Figure 23: Percentage home computer access

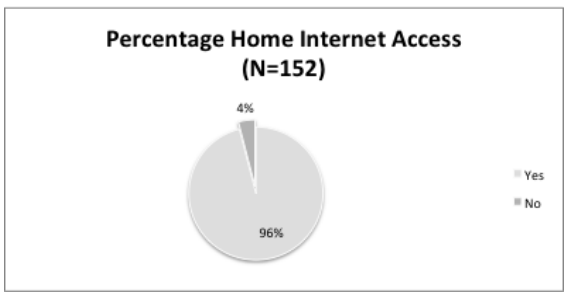


Figure 24: Percentage home internet access

Figures 23 and 24 show that an overwhelming majority of students have computer and internet access with 98% having access to a computer at home, or at the home of a close relative and 96% having internet access. In investigating student home access to ICT, Iske, et al, (2008); Stevenson, (2008) and van Braak & Kavadias, (2005) identify 'second-level digital divide' in that it is not whether students have access to a computer and the internet but, perhaps more importantly, how frequently they make use of the internet and what activities they use it for. As is discussed by Iske, et al (2008), Stevenson (2008) and van Braak & Kavadias (2005), the interpretation of access is more complicated than merely the availability of hardware and network connection. As can be seen below, in tables 20 and 21, most students make use of the internet at home on a daily basis, with the majority of students having access either in their own bedroom or throughout the house using Wi-Fi.

Frequency of Internet Use (N=158)	Number	Percentage
Every Day	111	70.3
Most Days	38	24.1
Once a week	6	3.8
Less often	3	1.9

Table 20: Amount of internet access in a typical week

Place (N=157)	Number			Percentage		
	Male	Female	Total	Male	Female	Total
Wireless – throughout home	40	46	86	47.1	63.9	54.8
Own Bedroom	27	22	49	31.8	30.6	31.2
Elsewhere in own house	7	2	8	8.7	2.6	5.1
At a relative's house	8	6	14	9.4	8.3	8.9

Table 21: Location of internet access

The majority of students in this questionnaire make extensive use of the internet at home, with only 1.9% not using the internet at least weekly (tables 20 and 21). As is discussed by Stevenson (2008) and Bennett & Maton (2010), while 96% of these students stated that they had access to the internet, it is clear that this does not mean that all students are using this every day but, most are. In terms of location, the majority of students have wireless internet access and can make use of mobile devices as well as desktop computers (table 20).

> *"…I hardly ever use a computer at home; I prefer to use my phone for internet" (student questionnaire response).*

This rise in use of mobile devices for internet use may also indicate how the internet is being used in terms of the prevalence of social networking and games. This move to mobile devices rather than desktop computers is not a local one, with Margaryan et al (2011), Lenhart et al (2010) and Kreutzer (2009) reporting similar findings both nationally and internationally. Madell & Muncer (2007) suggest that the rise in use of the mobile phone is related to the variety of communication methods it allows, including phone calls, text messages, use of social networking and email and therefore allows the user more control over how they communicate with others. Yet this use of mobile devices has important consequences for the school in terms of ensuring that

the VLE is easily accessible on these devices, if it is to be used to support learning outside of school.

What is of particular interest here is, despite some students making extensive and varied use of the internet, use of the VLE is limited. Students reported on how they made use of ICT at home, shown below in figure 25. The VLE is used infrequently, whereas the use of the internet to watch videos or listen to music and for social networking is high.

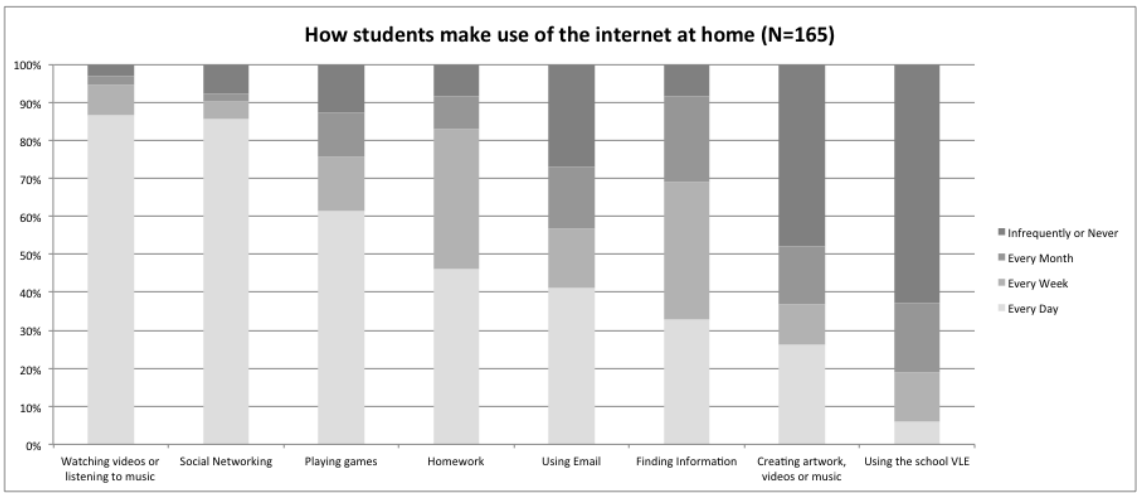


Figure 25: How students make use of the internet at home

Eynon & Malmberg (2011) identified the importance of schools in supporting the development of young people's internet skills. Schools should identify and provide support, where required, based on students' internet use outside the school as this internet use can lead to other informal learning opportunities (Eynon & Malmberg, 2011). Eynon & Malmberg's (2011) study of how young people make use of the internet at home identified four typologies of online behaviour with distribution as follows:

- *peripherals (31%)* - primarily younger students who do not make very much use of the internet and are less likely to make use of social networking sites.
- *normatives (32%)* - students that use the internet mainly for finding information, entertainment and communication

- *all-rounders (23%)* – use the internet for a range of different purposes, but are less likely to create and add content
- *active participator*s (14%) – use the internet for a range of different purposes and contribute e.g. blogging or video sharing. Students in this group tend to identify a particular interest in being 'good at' or caring about the internet.

By analysing questionnaire responses to questions of how students use the internet at home; scoring of activities was used to create groups based on those of Eynon & Malmberg (2011) and the distribution of groups here is broadly similar: *peripherals (10%), normatives (40%), all-rounders (34%)* and *active participator*s (16%). Their (Eynon & Malmberg, 2011) study involved a greater range of participants in terms of age including younger, primary school, users and so it is not surprising that in this study there are few peripheral users perhaps due to this difference in age. As there are fewer *peripherals* in this study, there are a higher percentage of *normatives* and *all-rounders*. However, it is interesting to note that the percentage of *active-participants* has not also increased.

As can be seen in the student responses below, '*normatives'* are the largest groups of students identified by Eynon and Malmberg (2011). These students use the internet mainly for finding information, entertainment and communication with limited use for creating and participating.

> *"…I use ICT to contact my friends, see what people are doing through social networking sites. I use it to type up work from home and print art pictures off the internet" (student questionnaire response).*

> *"…I use Facebook and YouTube at home" (student questionnaire response).*

> *"…I use my laptop for to get the football scores and who is playing" (student questionnaire response).*

Students that would be classed as '*all-rounders'* by Eynon & Malmberg (2011) make broader use of the internet than 'normatives' for example creating artwork or photo-editing, but are unlikely to participate in blogging or video-sharing with others. Here, '*all-rounders'* are represented in the research cohort as can be seen from the following quotes.

> *"…I watch and listen to videos on YouTube while searching the internet, playing games, checking emails or doing homework" (student questionnaire response).*

> *"Making animations or stop motion or movies and editing them but I don't like to publish them online" (student questionnaire response).*

'*Active-participators'* are often engaged in creative, participative activities such as video editing or blog posting as can be seen here. However, as described by Eynon & Malmberg (2011), they make up the smallest group.

> *"…I use ICT at home to design my own mini movies for my YouTube channel and I use it for Facebook, YouTube and Twitter, I also sometimes use my laptop to go on FiFA ultimate team" (student questionnaire response).*

> *"…making picture videos on windows movie maker to put on YouTube or to edit videos for YouTube" (student questionnaire response).*

> *"…I use my HP 6G2 Laptop to run my own Radio [station name] and setting up my own website and doing my own 6 hour Radio LIVE broadcast. I have all the Radio from a CAD U1 Studio Microphone with a Pop Filter and it's powered by Livestream.com" (student questionnaire response).*

The quotes above regarding the typologies of Eynon & Malmberg (2011) are reflective of the study cohort as a whole, as indicated above in figure 25. While some students state that they make use of the internet and ICT at home for homework, few suggested that they use the VLE. This is in contrast to the SLT vision for the use of ICT, in particular the VLE, to bridge the home-school divide. Therefore this lack of use of the VLE is important in this study and is discussed further in section 6.3.

Considering students' every day and weekly use of the internet (figure 25), while the majority of students make use of the internet for social networking and watching videos, a significant minority are engaged in creative uses. This is indicative of the 'participation inequality' of internet use whereby most users are passive and simply view the material, a smaller group may be modifying the content and a yet smaller group may create content (Hill et al, 1992). However, it is also important to note that all these uses of the internet provide informal learning opportunities for students (Eynon & Malmberg, 2011) whilst also remembering that not all students are involved in these practices and are not 'digital natives' (Selwyn; 2011a, 2012; Bennett & Maton, 2010). The implications of this tension may inform teachers' planned use of technology in schools in order to ensure that students are taught *digital literacy* skills, for example of finding information and evaluating information sources (Hague & Payton, 2010).

This section has investigated how students make use of ICT at home and how this links with their learning and ICT use in school. Eynon & Malmberg (2011), explain that it is important to recognize and understand the differences in young people's internet use at home, in contrast to their use in school, as this can then be used to develop the school curriculum to better suit their learning needs. Facer & Green (2007) state some schools do not recognize the learning that happens outside of the school and do not make good use of it to develop learning in school. This links with ideas of differentiation (Tomlinson, 2000; Subban, 2006) whereby students become more engaged in the learning process where differences in individual student learning profiles are addressed, including how students make use of technology outside the school and the informal learning this develops. While most students make considerable use of ICT, they do not often use the VLE and a small minority do not use ICT at home. In terms of ICT use, there are differences in terms of range of activities undertaken following Eynon & Malmberg's (2011) classification of types of student activity. This is important for schools in terms of ensuring that all students are equipped with digital literacy skills.

6.5.2 How Do Teacher Perceptions of Student Home Use Affect Their Practice?

This section investigates how teacher perceptions of student home use affect their practice, as identified through analysis of teacher questionnaire and interview data. Evidence from interviews and lesson observations shows that the teachers for whom students' home use of technology is seen in a positive light, in terms of teaching and learning in school, were more likely to use ICT in student-centred ways and make more varied use of technology in their classroom. Conversely, teachers that took a negative view of student home use were less likely to employ ICT in ways that support the SLT vision for *effective use of ICT*, mainly focusing on administrative tasks, presenting information and allowing students to use laptops for 'research' using the internet and 'writing up' in Word documents.

Teachers representing a range of departments identified how students' home use of technology helped with their learning either directly or indirectly

> *"Their access to the internet benefits them. The fact that they are able to use the internet for research, although this doesn't necessarily fit in with what we are teaching them, but then they can bring in those skills that they've learnt and enable them to find things better" (Interview response, Teacher D, Geography).*

> *"I think they are using lots of internet sites and their mobile phones and we have to be able to teach them to use those things safely but also maybe use them sometimes to help with teaching and learning" (Interview response, Teacher N, ICT).*

Whilst there is clear variation in terms of student access and use at home, students state that it is the role of the teacher to guide student's use of the VLE and ICT for learning in and out of school as illustrated by student's responses such as:

> *"…there's no point going on it [VLE] unless you need to, told to by a teacher" (Interview response, Student A).*

This is supported by a number of teachers, who perceive that it is the role of the teacher to make use of the way students use technology at home to aid learning in school.

> *"I don't know if there's a way we could use mobile phones in the classroom, but we should be using things they [students] are familiar with rather than always saying they can't use them as the reality is they do use them outside of school and we should use them in school" (Interview response, Teacher T, Art).*

> *"We are introducing lessons this year to focus on how to use some of the tools available on the internet, primarily, use of translation tools, as without good knowledge of grammar and idiomatic vocabulary, these can be detrimental to the pupils work and learning. The mobile phone is now being used increasingly, to record homework, to video work and to download dictionary apps, which are now available" (Interview response, Teacher L, MFL).*

> *"They use Facebook quite a lot – I think that's their main use outside of school and we do try and fit that in, using Fakebook and they have made Fakebook for characters in the novel we are reading at the moment" (Interview response, Teacher P, English).*

The data gathered from teachers through interview responses to questions about how student's use of technology outside school fits in with teaching and learning were classified into three groups. These categories were identified as: teachers who see students' home use as directly contributing to learning, those who see the role of the teacher as pivotal in making use of students' home experiences, and those that see outside use of ICT to have no impact on learning in school. In order to identify these categories, the views of Kent & Facer (2004), Facer & Green (2007) and Eynon (2010) were considered in terms of differences between home and school use of ICT and how the school has a role in developing digital literacies in all students.

As the quotes below demonstrate, teachers who expressed the opinion that students' home use of technology does not affect learning in school perhaps do not consider how the informal learning can be developed in school.

"I'm not totally convinced that games playing, watching TV on [for example] iPlayer on their laptop or phone until late in the night is necessarily a good thing so there are downsides in terms of their access to information and sometimes the information is not appropriate and so that concerns me" (Interview response, Teacher E, PE).

"Well, most of the kids tend to have access to technology, but it's just social networking, which doesn't really affect them too much." (Interview response, Teacher H, Maths).

Through analysis of interview responses to questions of how teachers make use of ICT and how they see students' home use of ICT as contributing to learning in school, it was seen that teachers who viewed students' home use of ICT as contributing to students' learning in school also identified a greater range of uses of ICT as shown below in figure 26.

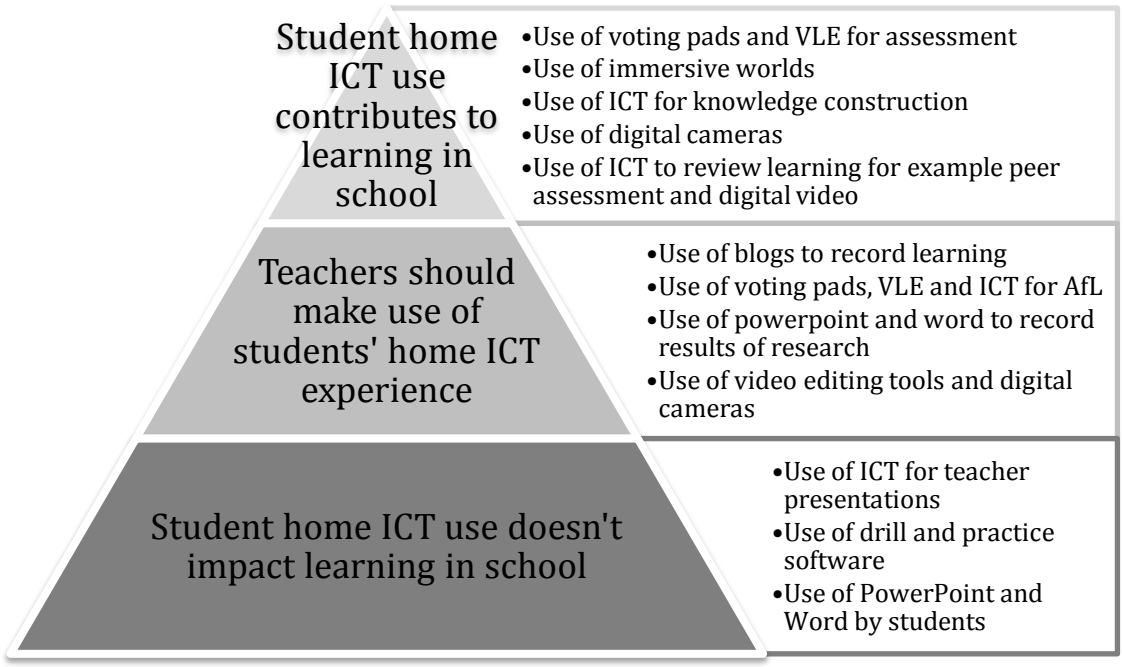


Figure 26: Teacher views of student home use of ICT and use of ICT to support teaching and learning

It was noted that teachers for whom student home ICT use does not impact on learning in school were more likely to use ICT in teacher-centred ways and less likely to make use of ICT in student-centred ways.

This consideration of teacher attitudes to student home use of ICT and how this can be used to support learning in school is supported by the views of Facer & Green (2007) and Eynon & Malmberg (2011). In order to address the variation in practice, it is important for the school to ensure that all staff are made more aware of young people's home use of the internet and how this can be used to support learning in and out of school. The views expressed by the staff here have an impact on ICT use within the school, particularly with respect to developing learning through the use of ICT. It is suggested that teacher attitude to student's home use of ICT inform the choices made by teachers in the use of ICT to support teaching and learning. Where teachers saw students' home use of ICT as contributing to learning, they were more likely to make use of ICT in student-centred ways. This finding is considered to add to the literature on teachers' beliefs and therefore teacher beliefs and attitudes towards student's home use of technology is discussed further within recommendations in chapter 7.

6.5.3 Summary

How students make use of ICT at home is important for schools and teachers to consider (Facer & Green, 2007; Eynon & Malmberg, 2011, Crook, 2012) in terms of how ICT can be used to support teaching and learning and also in developing students' digital literacies. This section showed that, for students at this school, access and use of the internet is high with only a small number of students not having access outside of school. In terms of use, while some students do make wide and varied use of the internet to produce as well as consume content, student's home use follows that found by Eynon & Malmberg (2011) and Crook (2012). It was also shown that teacher perception of students' home use of ICT is one factor explaining the variable use of ICT to support teaching and learning within the school and is addressed within recommendations in chapter 7. This is important, as this is a new variable linking teachers' beliefs with practice not currently identified within research literature. Student views of their school use of ICT support that of teachers, where students value the use of ICT to support their learning but suggest that the use of ICT is variable and improvements could be made. While students make use of the internet at home for a

variety of purposes, they do not often use the VLE and this is discussed in more detail in the next section.

6.6 CONCLUSION

This chapter identifies that, while first order barriers to the use of ICT do not appear to be present in the school studied here, ICT use is variable for teachers and students. It has shown that variation in student use is linked to variation in teacher use, as data from students indicates that they often make use of ICT in ways chosen by teachers. For example, when teachers do not use ICT, their students also do not. Contrary to the SLT vision for the use of ICT, use here is primarily for teacher-led activities, such as using the IWB to present information to students and to support administration. Student use of ICT, guided by teachers, often relies on using the internet to find information and to present information in Word or PowerPoint format. As described in more detail in chapter 5, there are tensions and contradictions between the SLT and other teaching staff in terms of how ICT is used. For example, the use of mobile devices is increasing within the school, but is contrary to the school policy on the use of such devices.

One aspect of ICT highlighted as desirable by the SLT is that of using ICT to bridge the home-school divide, including through the use of the VLE. However, the use of school ICT systems by parents has been shown to be very limited, through usage statistics and questionnaire data from parents. In addition, students' use of ICT at home has been analyzed. The majority of students make use of ICT at home, particularly the internet, but most students are consumers rather than producers, as is supported by other studies (Eynon & Malmberg, 2011; Crook, 2012). Teachers' perceptions of how students make use of ICT at home affect how teachers expect students to make use of ICT to support learning within school, indicating that it is important for the school to consider students' home use of technology. Recommendations, in chapter 7, explore this further.

Despite engagement from both teachers and students, e-portfolios were found to be unsuccessful. In particular, it was found that issues with the technology itself made

using the e-portfolio functionality challenging. Recommendations also consider the importance of the appropriateness of technology for audience and purpose.

Results of the data collected have been analyzed and presented in chapters 5 and 6 and a number of resulting recommendations have been highlighted. These recommendations concern the development of CPD, leadership of ICT and the use of student voice. Discussion of the research questions and recommendations follows in the next chapter.

Chapter 7 Discussion and Recommendations

7.1 INTRODUCTION

The study has investigated both how second-order barriers affect the integration and use of ICT and how ICT is used in practice within the secondary school environment. From this, the key contributions are:

- The importance of the Senior Leadership Team (SLT) and how their practice affects ICT integration and use across the curriculum
- The importance of teacher perceptions of students' home use of ICT and how this contributes to learning in school
- The importance of secondment to the ICT department in developing ICT practice across the school.

In particular, this thesis has identified a new variable that mediates between teachers' beliefs about the pedagogy of ICT and what they actually do in practice. From these findings, there are recommendations for the school to take forward for the three groups identified and investigated – the SLT, teaching staff and students within the school. These recommendations focus on the development of a community of practice across the school that is actively supported by the SLT, alongside a formal program of Continuing Professional Development (CPD) based on Starkey's (2011) digital learning matrix and development of the use of student voice.

This chapter discusses these findings before making recommendations in terms of policy and practice. This chapter will also evaluate the study considering limitations and contribution of the thesis.

7.2 DISCUSSION

This study investigated two separate but connected lines of inquiry, why ICT is used and not used within the school and how ICT is used in practice with a focus on the VLE and e-portfolios. This section discusses the research questions and findings from the study.

7.2.1 To what extent do conflicts and contradictions between policy and practice affect the use of ICT?

An important factor in technology adoption is that of leadership (Afshari et al, 2009). In this study, a number of tensions between leadership and teaching staff have been revealed. These included key differences in terms of vision, guidance and how 'effective use of ICT' is understood in practice. For the SLT, the vision for ICT use is clearly articulated through the adoption of the Teacher Effectiveness Enhancement Programme (TEEP) and the school's Teaching and Learning policy. In contrast, some teaching staff believe that more support is required. The need for the SLT to develop a shared vision for ICT use that is understood and supported by all staff is supported within the literature (Moyle, 2006; Franssila & Pehkonen, 2005; Flanagan & Jacobsen, 2003).

Through the new build process the school is well equipped with hardware and software. It is also well served by technical-support ensuring reliability. Analysis of school policy and interview responses suggests that ICT use is viewed by the SLT as a 'solved problem', highlighting technologically deterministic views about ICT and an inability to recognize second order barriers as significant (John & Wheeler, 2008). This is particularly evident in the choices made during the new build process in which all teaching rooms are equipped only with interactive whiteboards (IWBs) thereby limiting teachers' choice in the use of ICT and assuming that providing the technology would be sufficient ensure its use (Slay et al, 2008).

SLT interview responses also identify their view that it is 'up to teaching staff' to make use of the available resources in 'imaginative and creative ways'. While interview data

collected from members of the SLT suggest that this gives teachers more autonomy and choice in their use of ICT to support teaching and learning, in fact, some teachers find a lack of support inhibits their use of ICT. This need for support is identified by a number of authors (Meyer et al, 2011; Donnelly et al, 2011) and is also linked to the provision of CPD, as discussed further below.

In terms of making use of ICT in *imaginative and creative ways*, the data show that, despite their rhetoric, the SLT may overlook imaginative and creative uses of ICT that do not concur with their own views. For example, while some teachers make use of mobile devices, school policy, supported by the SLT, bans the use of these devices within lessons. Data collected also showed that some teachers' use of ICT meets the SLT vision but that, interestingly, these teachers identify that different groups exist within the school with respect to ICT practice. Those using ICT feel *on the periphery* despite meeting the SLT vision within their practice, as evidenced particularly in quotes from Teachers G and H. This is perhaps related to issues identified above, where the SLT perhaps overlook *imaginative and creative* uses of ICT that do not concur with their own views. SLT responses suggest that not all SLT members make use of ICT in ways that meet their own vision. Gibson (2002), Yee (2000) and Afshari et al (2009) all suggest that visible use of ICT by SLT is important in terms of ICT adoption, but it is not clear here whether the SLT recognize this.

Here it can be seen that the SLT are important in the integration of ICT through the development of the school vision and policy but also through their own practice. Therefore, there are challenges for the SLT in promoting the use of ICT more effectively as indicated within recommendations below, and challenges for teaching staff where, as identified above, more support may be required in interpreting the vision into practice. This is supported by (Baylor & Ritchie, 2002) who also identify the need for the SLT to promote the use of ICT through their own practice and is discussed within recommendations below.

7.2.2 How do teacher beliefs affect the use of ICT to support teaching and learning?

While some practice meets the SLT definition of effective use of ICT and vision, the data gathered here and wider literature show that teachers' beliefs are important in determining ICT use. Teacher confidence, attitude to ICT and perception of student home use and how this supports learning in school were all found to be significant here. Teachers with a more positive attitude to ICT use, and teachers with high confidence in their own ICT abilities are more likely to use ICT in student-centred ways, as is supported by the findings of Kreijns et al (2013) and Kim et al (2013).

While theories of technology adoption identify perceived ease of use, perceived usefulness, social influence and institutional support as factors that affect technology use, teacher role identity should also be considered (Straub, 2009). Teacher attitudes to the use of ICT play an important part in determining how the technology is used to support teaching and learning, with some teachers identifying conflicts between the use of ICT and their control of student activities in the classroom. However, other teachers acknowledged that ICT had changed their role as a teacher but were positive about the impact. Here, teachers identified how they saw the role of the teacher changing as a result of ICT, in particular ideas of curriculum content and teaching methods. In particular, teachers of music identified how technology had changed the curriculum and how it was taught.

Teacher professional identity is important in understanding how and why ICT is used (Beijaard et al, 2000). Teachers in this study explained how their own experiences with ICT influenced their use of ICT to support teaching and learning. Teacher attitude to ICT is also linked with collaboration with colleagues and CPD in that teachers with a more positive attitude to ICT were also more positive about collaboration and ICT based CPD. In addition, teacher confidence in their ICT abilities was shown to be positively linked with their attitude to the use of ICT. Teacher confidence in their own ICT ability, along with a positive attitude towards ICT use, is important in technology adoption and in terms of developing students' digital literacies, as is supported within other studies (Wastiau et al, 2013).

Questionnaire and interview data collected here shows that teacher confidence in their own ICT skills is linked with how teachers expect students to make use of ICT. Teachers whose confidence in their ICT abilities is high are more likely to use technology in student-centred ways, as shown in the data collected here and supported within the literature (Wastiau et al, 2013; Loveless, 2003).

7.2.3 How is teacher knowledge, of policy, new technologies and the pedagogy of ICT, developed?

CPD is identified within the literature as important in developing the use of ICT to support teaching and learning. In particular, CPD should develop pedagogy as well as skills (Ertmer & Ottenbreit-Leftwich, 2010; Loveless, 2011). Here, the data collected shows that CPD is arranged and delivered in-house and mainly focuses on skills rather than pedagogy. It is also suggested by the SLT that these training requirements can be met in-house leading to challenges for the members of staff delivering this training in terms of developing their skills and knowledge.

SLT interview data shows that it is expected that teachers identify their own training requirements with the expectation that in-house provision will meet these requirements. SLT members suggest that this provides teachers with control over their training and gives teachers choice in terms of professional development options. Data from teachers suggest that this is also an area where more support is required and it is not clear how the availability of in-house provision maps onto these requirements. Teachers here identify the importance of collaboration in developing their skills and knowledge, as is supported within the literature (Wachira & Keegwe, 2011).

Ertmer & Ottenbreit-Leftwich's (2010) recommendations for professional development identify a number of desirable aspects of CPD, including the importance of including technology development in CPD plans, the importance of considering teachers' pedagogical beliefs and giving opportunities for teachers to work together in and out of the classroom. Here is was noted that through teaching Key Stage 3 ICT as an additional subject allowed for teachers to work together in and out of the classroom, with support of the ICT department thereby meeting Ertmer & Ottenbreit-Leftwich's

(2010) recommendations. Hennessy et al (2005) also emphasize the importance of developing communities of practice to develop and share practice. It is suggested here that working with/within the ICT department could be an effective approach to CPD in terms of meeting these requirements. Analysis of observation, questionnaire and interview data with staff show that working with or within the ICT department has a positive effect on teachers' views of ICT and also has an effect on how these teachers make use of ICT within their own subject highlighting the importance of collaboration.

7.2.4 How is ICT used to support teaching and learning in practice, including how students, parents and teachers understand and negotiate their roles when using the VLE and e-portfolios

In practice, the use of ICT is variable within and between departments, but lesson planning document analysis indicates that ICT use is more likely to be teacher-led contrary to the SLT vision for student-centred ICT use. Questionnaire and interview data shows that teachers choose to use ICT in teacher-led ways, as these are valued in terms of supporting teaching and learning, something that was also found by Windschitl & Sahl (2002) and Lim & Barnes (2002) in their studies.

One aspect of this study concentrated on the use of the VLE and e-portfolios as specific examples of ICT use within the school. VLE statistics highlighted that use was variable for teachers and students and parents rarely made use of the VLE. Students identified that they used the VLE when directed to by teachers; therefore understanding teacher variation is important. Teachers who make use of the VLE value its contribution to teaching and learning. VLE statistics demonstrated that the ICT department made significant use of the VLE, and as described above, teachers who worked with or within the ICT department typically increased their VLE use within their own subject area. This builds on the work of Triggs & John (2004) who found that teachers who formed supportive groups within their subject developed their practice. However John (2005) emphasizes how differences in secondary school subjects shape teachers' practice within these subjects.

Introduction of e-portfolios was unsuccessful, despite engagement from students and staff, with technical issues causing implementation problems. In particular, ease of use and user interface issues were highlighted. This is consistent with Luik (2011) in terms of the importance of ease of use in technology acceptance. Lack of options for customization of the user interface were identified as limiting use by students, linking with the idea that students want education and ICT tools to be pleasant. This idea that students expect education to be entertaining, leads to challenges for staff where their focus is on teaching and learning (Hill et al, 2012).

In addition to challenges caused by the technology itself, students identified that, when asked to include their 'best work', this caused difficulties for them in making choices of what elements to include. Marriott & Chomba (2010) stated that, by encouraging students to include their 'best work', reflection and self-assessment would be developed. However, here it was shown that students need support and time to create their e-portfolios particularly as the idea of 'best work' was limiting for some students in that it made them very conservative in their choices. Here, it was felt that students did not have time to focus on self-assessment and reflection, as issues with the technology detracted from this and in particular, did not allow for peer feedback. Feedback from peers and teachers is seen as important to support student self-assessment and reflection by Clegg et al (2005) and Nicol & McFarlane-Dick (2006).

7.2.5 To what extent is ICT use influenced by factors such as the students' 'digital literacies' and, in particular, the ways in which students access and use ICT in and out of school?

Student use of ICT outside of school is variable. However, use of the VLE outside the school was low for all users. Staff perception of students' home ICT use and how this influences learning in school is an important factor as indicated above.

Data collected on student use of ICT and the internet at home show that use is high, but students mainly consume rather than produce content. The majority of students make use of the internet on a daily basis, but most use the internet for entertainment,

communication and for finding information, with many students explaining that they mainly used mobile devices. Approximately 14% of students identified that they actively created content. This is consistent with findings of other studies of student use of the internet outside of school (Eynon & Malmberg, 2011; Crook, 2012)

Students' value the use of ICT to support their learning in school, both in terms of its motivational effects and methods of learning through producing multimedia representations of knowledge, for example (Palmen, 2011; Livingstone, 2009). It is suggested within literature (Kent & Facer, 2004; Bennett & Maton, 2010; Eynon, 2010; Facer & Green, 2007) that in developing digital literacies for all students it is important to consider how students make use of the internet at home.

In terms of students' home ICT use, data collected here suggests that it is teacher perception of student home use of ICT, rather than use itself that has the bigger effect on how teachers expect students to use ICT in school. This links with the importance of teacher beliefs and role identified above, and is particularly interesting, as this link is not identified in the current literature. Teachers who view students' home use of ICT as contributing to learning in school were more likely to use ICT for student-led creative and collaborative tasks. In contrast, teachers that did not see students' home use of ICT as contributing to ICT use in school, or thought that it had a negative impact were more likely to use ICT for only teacher-led purposes. As described by Kent & Facer (2004) and Bennett & Maton (2010), it is important for the school to consider how to make use of the skills and interests students develop at home.

As noted above, students make use of the VLE when directed to by their teachers. It is interesting to note that students' use of the VLE at home is low and that VLE is more likely to be used within school time, despite the SLT aim for use of VLE to support homework. This again highlights conflict between the SLT vision and ICT use in practice and is in contrast with the idea that the anywhere-anytime nature of access should allow for extension of the educational environment within and beyond the time and space of the school day (DfES, 2005b; Britain & Liber, 2004).

In conclusion, this study has investigated two separate but connected lines of inquiry – how second-order barriers affect the integration and use of ICT and how ICT is used in practice. From the discussion above, it is clear that second-order barriers are important in explaining differences in ICT use seen within and between departments across the school. Despite the SLT vision for student-centred use of ICT and use of the VLE to facilitate home-school liaison, ICT use continues to be mainly teacher-led and the VLE is used more frequently in school time than at home by students. Discussed above is the importance of the SLT and how their practice affects the use of ICT, the importance of CPD and how the ICT department support the development of the use of ICT across the curriculum and the importance of teachers' beliefs in understanding how ICT is used in practice. Therefore recommendations follow for the school studied here, in terms of developing more student-centred use of ICT and include recommendations for the SLT, teachers, and students within the school.

7.3 RECOMMENDATIONS

In terms of the findings and emerging themes, as discussed above, a number of recommendations for the school in this study are identified. These recommendations concern, in particular, the development of CPD, leadership of ICT, and the use of student voice. It is suggested that the development of a community of practice (Lave & Wenger, 1991) in the use of ICT throughout the school would be of benefit here, as is supported by Henessey et al (2005), Ertmer & Ottenbreit-Leftwich (2010) and McDermott & Archibald (2010). This community of practice should cross disciplinary boundaries and, importantly, should be actively supported by and engaged with by the SLT. This builds on the work of Wenger et al (2002) who suggest that organisations can support and develop communities of practice, Triggs & John (2004) who showed that communities of practice within specific subjects developed practice and Duncan-Howell (2010) where the benefits of forming online learning communities are shown.

It is important to note the distinction between communities of practice (Lave & Wenger, 1991; Wenger, 1999; Wenger et al, 2002) and the school's current model of coaching groups. While coaching groups may share some similarities (Cox, 2005),

communities of practice are characterized by mutual engagement in a common purpose, development of knowledge and shared practice and may also build relationships (Lesser & Fontaine, 2004; Wenger et al, 2002). To support the development of coaching groups, it is suggested that the school provides additional time within the school week and termly meetings structure for communities of practice to meet without compromising the curriculum time allocated for coaching. Where resources are limited, however, finding the time, space, organizational support and leadership that communities of practice need to develop may be not be straightforward. In addition, even if successfully established, communities of practice may face difficulties in terms of power issues, how new staff join and participate, and the effects of institutional reorganisation (Eraut, 2002; Lesser & Fontaine, 2004; Cox, 2005; McLaughlin & Talbert, 2006), all of which mean that their development may be problematic in the school context. In addition, Cox (2005) cautions that where communities of practice are organized by management, this may be counterproductive, with the intention seen as a form of control rather than improved professional development.

- Develop CPD program focusing on the pedagogical use of ICT, linking this to teaching and learning policy within the school

Evidence from interviews with the SLT and teaching staff showed that whole school focus on TEEP pedagogy involves 'effective use of ICT' but that understanding of this term is varied. Further evidence in terms of CPD showed that the main focus is on teacher skills development. While teachers' reasons for developing use of ICT within their own practice sometimes focus on pedagogy, this is an area where CPD can be strengthened and linked to the school's teaching and learning policy. This is supported by a number of authors in terms of the importance of CPD to focus on pedagogy of ICT (Kirschner & Davis, 2003; Franssila & Pehkonen, 2005; Mishra & Koehlar, 2006; Loveless, 2011). Evidence in this study showed that staff are expected to identify their own need for CPD in ICT, but the literature relating to effective CPD suggests that a more formal approach should be developed (Minaidi & Hlapanis, 2005; Kirschner & Davis, 2003; Franssila & Pehkonen, 2005).

Interview and questionnaire data from staff identified that the school lacks a visible focus on the use of ICT and the development of space in communal staff areas for a focus on the use of ICT would be desirable. While Ertmer & Ottenbreit-Leftwich (2010) do not specifically include this in their recommendations for developing CPD, implementing this would meet their guidance for developing sharing of practice.

Therefore, it is recommended that the school here develops a program of CPD for ICT in conjunction with teaching staff that includes a clear focus on pedagogy (c.f. Ertmer & Ottenbreit-Leftwich, 2010; Minaidi & Hlapanis, 2005; Kirschner & Davis, 2003; Franssila & Pehkonen, 2005). This would entail a series of training sessions where the focus is on pedagogy, practical applications, and sharing good practice, making use of Starkey (2011) to provide structure as illustrated in table 22 below. This would then be supported through the existing coaching program within the school and through departmental meetings.

Session	Focus
1	What is effective use of ICT?
2	Thinking about connections
3	Thinking about concepts
4	Critiquing and evaluating
5	Creating knowledge
6	Sharing Knowledge

Table 22: Recommendation of programme of CPD for ICT based on Starkey (2011)

As is highlighted by staff in this study and within the literature (Ertmer & Ottenbreit-Leftwich, 2010), some staff may also want technical skills training, therefore it is also suggested that a separate program of skills 'workshops' should also be considered by the school and may be facilitated by the school's IT support staff and sixth form students of ICT.

- Involve staff in discrete ICT teaching and make use of department champions of ICT

Evidence in data collected in teacher questionnaires, interviews and VLE log data show that teachers who have been involved in teaching of ICT outside their subject area

often make further use of ICT within their subject area. Questionnaire data also shows that positive attitudes to the use of ICT and working with or within the ICT department are linked. An approach to developing the use of ICT across the curriculum is to involve teachers in teaching discrete ICT and to develop networks of sharing practice with the ICT department. However, it should be noted that the teachers who 'volunteer' to teach ICT as an additional subject may be those who are likely to be ICT adopters and therefore the effect is to encourage the willing rather than create new enthusiasm. Nonetheless, here it has been shown that, through the teaching of ICT as an additional subject, these teachers then make use of ICT in more student-centred ways within their own subject.

Hennessy et al (2005) emphasize differences between subject cultures within secondary schools in terms of ICT practice and it is suggested that creating communities across subjects would encourage sharing of practice. While Ertmer & Ottenbreit-Leftwich (2010) do not identify working with the ICT department within their recommendations in terms of developing CPD and practice, this method would meet the requirements they identify in terms of enabling exposure and practice with the use of ICT, with the support of the ICT department.

Using evidence from interviews and lesson planning audit, departments where ICT use is more likely to be teacher-led are MFL, maths, sociology and science therefore it is recommended these departments would benefit from this process initially, followed with drama, DT and PSHE.

- Visible leadership of ICT from SLT; incentivize desirable uses of ICT and demonstrate vision through own practice

Analysis of data collected through interviews and questionnaires with teaching staff and SLT identified tensions between SLT and teaching staff. This included the vision and policy relating to ICT in that, for the SLT the vision for ICT was clear but some staff found that they required further guidance and support. It was shown that time pressures on teaching staff mean that priority will be given to developing techniques

that are publicly valued and judged within formal lesson observations for performance monitoring, for example.

As, for some SLT members, the use of ICT within their own practice did not meet the SLT vision this is an area for development for the school. The importance of visible leadership of ICT is supported by a number of authors, particularly in terms of the importance of the SLT being seen to implement their vision within their own practice (Afshari et al, 2009; McGarr & Kearney, 2009). As is described by Moyle (2006) in terms of developing the use of ICT, a transformational leadership style may be desired.

In practice, the SLT need to be seen to take active part within CPD and their own practice in addition to the monitoring of department performance, perhaps within line management meetings, as was indicated within the results of the data analysis. In addition, ICT may be included within performance management and lesson observation judgments and good practice should be recognized and rewarded through existing school structures.

- Develop use of 'student voice' information relating to students' home use of technology and their views on learning activities and develop methods of disseminating this information among teaching staff

Data collected from student questionnaires and interviews shows that, in general, students are positive about use of ICT to support their own learning. Students described how they use the internet at home and, while most students use the internet, only a small number reported that they produce rather than just consume content. This pattern of use is consistent with other studies in terms of students use ICT at home (Eynon & Malmberg, 2011).

However, it is interesting to note that teachers who consider students' home use of ICT make more varied use of ICT within teaching and learning. A number of authors highlight the importance of developing digital literacies in all students, and it is important that students' home use of ICT should be considered (Furlong & Davies, 2012; Iske et al, 2008; Hsu, 2011). Therefore it is suggested that the use of 'student

voice' and dissemination of this information among teaching staff should be developed. Student voice here would provide the school and teachers with information in terms of how students use ICT at home and how they view the use of ICT in schools. As indicated above, within literature and findings in this study, it is important for the school to make use of the skills and interests students have, whilst also ensuring that all students have opportunities to develop new digital literacy skills (Kent & Facer, 2004; Bennett & Maton, 2010; Eynon, 2010; Facer & Green, 2007).

In keeping with current school practice with conducting surveys of student opinions on a regular basis it is recommended that questions relating to ICT are added and analysis shared at whole staff briefings. In addition, results of student voice can be used within CPD program as described above.

- Appropriateness of technology for audience and purpose should be considered

Despite engagement from ICT staff and students supporting the development of e-portfolios the implementation was unsuccessful. Evidence in questionnaire and interview data collected from students and staff suggest that technology use can be limited by software design (HCI) issues in that the e-portfolios failed to work as intended. Therefore, while recommendations above concerning CPD, student voice, and leadership of ICT are suggested to develop the use of ICT to support teaching and learning, it is also important for teachers and the SLT to consider the technology itself, particularly as ICT change is rapid (Selwyn, 2010; Selwyn et al, 2011). As is supported by Melhuish & Falloon (2010) and Straub (2009), there are social and contextual factors to consider in technology adoption and it should not be assumed that technology will 'work' merely because it is popular. Here, issues with ease-of-use limited the usefulness of the software.

7.4 LIMITATIONS OF THE STUDY

As described within chapter 4, this small-scale case-study took place within my own institution and therefore issues are raised both in terms of generalization from case

studies (Hammersley, 1992; Weiss, 1994) and the nature of insider research (Mercer, 2007; Drake, 2010). As described in chapter 4, in using Lincoln & Guba's (1985) requirements, findings from this study can be considered to be trustworthy.

With respect to data collection and analysis methods, limited data was collected from parents. Due to problems with the software, parents were not invited to have access to their child's e-portfolio. Therefore data collected from parents was limited to questionnaire gathering information about their general use of ICT tools with respect to the school. This questionnaire had poor response rate, limiting its usefulness here but response rates from students and staff were considered to be good. VLE log data was sampled rather than make use of all the logs produced, as technological issues prevented the download of such volume of data and current processing capabilities of Microsoft Excel and SPSS limit the number of records than can be processed at any one time. However, the data collected and analyzed was considered to be a representative sample of VLE activity as the sample covered different times within the school year and patterns within the data were confirmed through triangulation with student and teacher perceptions of use within questionnaire data.

The small-scale case study approach undertaken focused on one school; therefore it is difficult to say whether this site is typical of a technology-rich institution. Due to resources and time limitations it was not possible to conduct a multisite or comparison study here. Therefore future research to investigate whether findings here are replicated in other institutions is suggested.

In addition, in an ideal world this study would have undertaken action-research to implement the recommendations given above and evaluate their impact on the use of ICT within the school. However, this is out of scope of this research and therefore, again, further research of this nature is suggested.

7.5 Contribution of the Thesis

This study took place within a technology-rich environment, where it was expected and shown that first-order barriers had limited effect on ICT use. Therefore this study

aimed to show how ICT is used within a secondary school context on a day-to-day basis and by paying attention to:

> *"…the contradictions, compromises and conflicts that lie behind the realities of technology use in education." (Selwyn, 2011b, p. iix)"*

In considering a social constructionist perspective (Burr, 1995; Gergen, 2001; Raskin, 2002; Lock & Strong, 2010), this study has investigated how ICT use is shaped and valued within the school and how shared meanings and understandings are developed. Issues of power and control with respect to institutional ICT policy and practice were also identified (Allen, 2005; Ball, 2012b), however issues relating to external policy were not considered in detail. Here the *contradictions, compromises and conflicts* were seen in terms of differences arising between the SLT and teaching staff in interpreting the vision for effective use of ICT in practice. Examples of this included how the SLT vision for ICT use promotes student-centred use of ICT but in practice ICT use is more likely to be teacher-led, and the views of the SLT that it is up to teachers to be *imaginative* and *creative* in their use of available resources in following school policy but that some teachers felt that more guidance and support was required.

In terms of findings, this study adds to the existing literature on the effect of teachers' beliefs in terms of the identification of a link between how teachers view students' home use of ICT and its contribution to teaching and learning within school and how teachers make use of ICT. There is comprehensive literature on the effect of teachers' beliefs, including how teachers' own use of ICT outside of school affects the use of ICT within school (Hsu, 2011) and how beliefs about the efficacy of ICT relates to practice (Palak & Walls, 2009) but current literature does not link teachers' beliefs about students home use of ICT with practice. This finding also builds on the findings of Kent & Facer (2004) and Bennett & Maton (2010), in terms of how the school should make use of students' skills and knowledge developed at home.

Figure 26 shows the findings from this study, in terms of how teachers' perception of students' home use of ICT affects how teachers plan to use ICT in the classroom, with teachers who see home use of ICT as positive being more likely to use ICT in student

centred ways. As highlighted above, however, generalisation from small-scale case studies such as this one is problematic and figure 26 is best seen as providing an example or hypothesis that future research could further investigate.

In addition, the effect of the ICT department was found to be important here in terms of collaboration with colleagues in other departments. In terms of effective CPD, working with or within the ICT department, including teaching ICT outside of a teachers' own subject specialism, was linked with a more positive view of ICT and more use of ICT within the subject specialisms. While existing literature highlights the importance of CPD and communities (Ertmer & Ottenbreit-Leftwich, 2010; Duncan-Howell, 2010), the role of the ICT department within the school is not discussed. This finding therefore builds on the literature where developing subject based communities of practice are identified as successful (Triggs & John, 2004).

Future research in this area may focus on investigating further the link between teachers' perception of students' home use of ICT and teachers use of ICT within the classroom and on the impact of working with / within the ICT department to determine whether these links are seen in more widespread contexts.

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Appendix A – Information Sheets and Consent Forms

Student Information Sheet and Consent Form

Use of the VLE and Online Learning Portfolios
Participant Information Sheet & Consent Form
I would like to invite you to take part in research on the school's use of the VLE and online learning portfolios. A VLE can be defined as 'software designed to support teaching and learning by providing online tools for assessment, communication and uploading of content, for example' and ours can be found at [address] Before you decide to take part, it is important you understand why this research is being done and what will be required of you. Please ask your tutor or email me if you have any questions: (email address).

Why am I doing this research?
VLE use is increasing both in your school and across the world. As a Technology College we aim to provide you with new opportunities and make the best use of our available resources. All Year 9 students will be making use of online learning portfolios and the aim is to understand how students construct their portfolio and how students use the available technology in order to improve this experience and your learning in the future.

What will be involved?
You will be using the VLE and your learning portfolio in your ICT lessons. To take part in the research you will be asked to complete a small number of questionnaires during the year. A small number of pupils will also be selected take part in interviews providing more in depth information about their work.

When and where will this happen?
You will complete most things during your ICT lessons. If you are involved in interviews, you may be taken out of other lessons but all of the research will take place in school time.

What will I do with this information?
With your permission, I will record the interviews and produce a written record of what was said. You will be able to read this record and make changes if you think it is inaccurate. At the end of the research I will write a report on what happened, including parts of what was said during the interviews and you will also be able to read this if you want to. The results of the questionnaires will be collected together and summaries included in the final report; your individual responses will not be seen by anyone except me.

Will everything you say in the questionnaire and interview be kept private?
What you say in both the questionnaire and interview will remain confidential. When the research is written up your name will be changed so no one can identify you. Nothing you say will get you into trouble in school.

What if you change your mind about taking part?
You can change your mind at any time about taking part and you do not need to give a reason. There will be no consequences for you.

Thanks
Mrs R Farmery

Use of the VLE and Online Learning Portfolios
Consent Form

Please read the information sheet and the initial and sign this form to confirm your initial participation in the research.

	Initial
I have read the information sheet, had time to think about the information and have had any questions answered.	
I am willing to take part in the research.	
I am aware that I can withdraw from the research at any time.	

Name of participant _____

Tutor Group _____

Signature _____

Date _____

Name of person taking consent _____

Signature _____

Date _____

Parental Information Sheet and Consent Form

Use of the VLE and Online Learning Portfolios
Parental Participant Information Sheet
Your child has been invited to take part in research on the school's use of the VLE (Virtual Learning Environment) and online learning portfolios to be conducted in the 2010 – 2011 academic year. A VLE can be defined as 'software designed to support teaching and learning by providing online tools for assessment, communication and uploading of content, for example' and ours can be found at [web address]. Before the research commences it is important you understand why this research is being done and what will be required of your child. Please email me if you have any questions (email address).

Why am I doing this research?
VLE use is increasing both in [School] and across the world. As a Technology College we aim to provide all students with new opportunities and make the best use of our available resources. All Year 9 students will be making use of online learning portfolio and the aim is to understand how students construct their portfolio and how students use the available technology in order to improve this experience and the learning of all students, in the future.

What will be involved?
Year 9 students will be using the VLE and learning portfolios in their ICT lessons. To take part in the research your child will be asked to complete a small number of questionnaires during the year. A small number of students will also be selected take part in interviews providing more in depth information about their work. Students will be selected for interview based on their initial questionnaire responses in order to provide a representative sample in terms of gender, home IT access and attitudes to ICT; students can decline to take part in either questionnaire or interview and may withdraw from the process at any time.

When and where will this happen?
Students will complete most activities during their ICT lessons. If your child is involved in interviews, they may be taken out of other lessons but all of the research will take place in school time.

What will I do with this information?
With permission, I will record the interviews and produce a written record of what was said. Your child will be able to read this record and make changes if they think it is inaccurate. At the end of the research I will write a report on what happened, including parts of what was said during the interviews and they will also be able to read this if they want to. The results of the questionnaires will be collected together and summaries included in the final report; individual responses will not be seen by anyone except me.

Will everything said in the questionnaire and interview be kept private?
What is said in both the questionnaire and interview will remain confidential. When the research is written up all names will be changed so no one is identifiable.

What if you change my mind about your child taking part?
You can change your mind at any time about your child taking part and you do not need to give a reason. Students can also withdraw at any time.

Thanks,
Mrs R Farmery

Use of the VLE and Online Learning Portfolios
Parental Participation Opt Out Form

Please ensure you have read the above details concerning the nature and practicalities of the research. You only need return this form if you DO NOT want your child to participate in the research. Your child will automatically be included in the study if you do not return this form.

	initial
I have read the information sheet, had time to think about the information and have had any questions answered.	
I am not willing to allow my child to take part in answering questionnaires	
I am not willing to allow my child to take part in interviews	

Name of Child _____

Tutor Group _____

Name _____

Signature _____

Date _____

Please return this form to Ruth Farmery or to the school's reception.

Appendix B – Student Questionnaires

Questionnaire 1

Y9 ICT & VLE questionnaire

This is the first questionnaire for Y9 students. This questionnaire is designed to find out your opinions on ICT lessons; the school VLE and also to find out what technology you have access to at home and how you use it.

You can leave any question blank if you do not wish to answer it.

Section 1 - Your Details

1 Please select your gender

Choose...

2 Please select your tutor group

Choose...

3 Do you receive any help or in-lesson support from the Learning Zone

Choose...

4 Do you receive Free School Meals?

Choose...

5 Do you have access to a computer or laptop outside of school?

○ Yes ○ No ◉ No answer

6 If yes, where do you have access to the computer or laptop?

- ☐ Kitchen
- ☐ Dining Room
- ☐ Lounge
- ☐ Study
- ☐ Your Bedroom
- ☐ Somewhere else in your house
- ☐ Anywhere in your house (laptop)
- ☐ A house of a relative
- ☐ Public Library
- ☐ Other

7 Do you have access to the internet outside of school?

○ Yes ○ No ◉ No answer

8 If yes, where do you have access to the internet?

- ☐ Kitchen
- ☐ Dining Room
- ☐ Lounge
- ☐ Study
- ☐ Your Bedroom
- ☐ Somewhere else in your house
- ☐ Throughout your house (wireless)
- ☐ A house of a relative
- ☐ Public Library
- ☐ Other

Section 2 - Your use of the internet

9 In a typical week, how often do you use the internet outside of school?

- ○ Every day - more than 2 hours per day
- ○ Every day - up to 2 hours per day
- ○ 4 or 5 days per week
- ○ 2 or 3 days per week
- ○ Once a week
- ○ I do not use the internet every week
- ◉ No answer

10 When you use the internet outside of school, how often do you use it for each of the following activities?

	Over two hours per day	1-2 hours per day	0-1 hours per day	1-2 hours per week	1-2 hours per month	Never
Finding information	○	○	○	○	○	○
Email	○	○	○	○	○	○
Shopping	○	○	○	○	○	○
Doing homework	○	○	○	○	○	○
Watching videos or listening to radio or other music	○	○	○	○	○	○
Blogging (creating own blog)	○	○	○	○	○	○
Reading blogs or web comics	○	○	○	○	○	○
Social Networking (Facebook, Bebo, Instant Messenger etc)	○	○	○	○	○	○
Creating artwork, videos or music	○	○	○	○	○	○
Downloading music or filesharing	○	○	○	○	○	○
Playing Games	○	○	○	○	○	○
Other	○	○	○	○	○	○

Section 3 - Attitude to ICT

11 In your ICT lessons...

	Every lesson	Most lessons	Some lessons	Rarely	Never
I discuss my ideas	○	○	○	○	○
I give my opinions during class discussions	○	○	○	○	○
The teacher asks me questions	○	○	○	○	○
My ideas and suggestions are used during classroom discussions	○	○	○	○	○
I ask the teacher questions	○	○	○	○	○
I explain my ideas to other students	○	○	○	○	○
Students discuss with me how to go about solving problems	○	○	○	○	○
I am asked to explain how I solve problems	○	○	○	○	○
Getting a certain amount of work done is important to me	○	○	○	○	○
I do as much as I set out to do	○	○	○	○	○

12 In your ICT lessons...

	Every lesson	Most lessons	Some lessons	Rarely	Never
I know the lesson objectives	○	○	○	○	○
I am ready to start learning on time	○	○	○	○	○
I am able to achieve the learning objectives	○	○	○	○	○
I know my targets	○	○	○	○	○
I pay attention	○	○	○	○	○
I try to understand the work	○	○	○	○	○
I can complete the work	○	○	○	○	○
I know how much work I have to do	○	○	○	○	○

13 How far would you agree with each of the following statements?

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
ICT lessons are enjoyable	○	○	○	○	○
I would like to join an ICT lunchtime / afterschool club	○	○	○	○	○
I would like a job in ICT after leaving education	○	○	○	○	○
I like ICT lessons	○	○	○	○	○
School should have more ICT lessons per week	○	○	○	○	○
I would like to be given a piece of ICT equipment as a present	○	○	○	○	○
ICT lesson bore me	○	○	○	○	○

14 How far would you agree with each of the following statements?

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
I prefer to do my own investigation than to find out information from the teacher	○	○	○	○	○
A career in ICT would be dull and boring	○	○	○	○	○
I would rather solve a problem by doing an investigation myself than be told the answer	○	○	○	○	○
I look forward to going to ICT lessons	○	○	○	○	○
I would enjoy school more if there were no ICT lessons	○	○	○	○	○
I learn new things in ICT	○	○	○	○	○

Section 4 - Attitude to the VLE

15 The school VLE (moodle)...

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
Has made me more interested in my work	○	○	○	○	○
Is good for working with other students	○	○	○	○	○
Helps me think more about my own learning	○	○	○	○	○
Helps me to be creative	○	○	○	○	○
Helps me to feel confident about my school work	○	○	○	○	○
Helps me to see where I need to do better	○	○	○	○	○
Helps me to plan how to improve	○	○	○	○	○

16 The school VLE (moodle)...

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
Helps me to understand my work better	○	○	○	○	○
Is something I would like to use in future	○	○	○	○	○
Helps me to learn	○	○	○	○	○
Helps us give feedback on each other's work	○	○	○	○	○
Is easy to use because teachers help me	○	○	○	○	○
Is something I use at home	○	○	○	○	○
Allows me to access materials to help me learn	○	○	○	○	○

17 I use the VLE during lessons or for homework in...

	Often	Sometimes	Rarely	Never
Art	○	○	○	○
Drama	○	○	○	○
DT	○	○	○	○
English	○	○	○	○
Geography	○	○	○	○
History	○	○	○	○
ICT	○	○	○	○
Maths	○	○	○	○
MFL (French / Spanish)	○	○	○	○
Music	○	○	○	○
PE	○	○	○	○
RE / PSHE / Citizenship	○	○	○	○
Science	○	○	○	○
Other	○	○	○	○

Questionnaire 2

Y9 ICT & VLE questionnaire

This is the first questionnaire for Y9 students. This questionnaire is designed to find out your opinions on ICT lessons; the school VLE and also to find out what technology you have access to at home and how you use it.

You can leave any question blank if you do not wish to answer it.

Section 1 - Your Details

1 Please select your gender

Choose...

2 Please select your tutor group

Choose...

3 What schools have you attended?

Choose...

4 Do you have access to a computer or laptop outside of school?

○ Yes ○ No ◉ No answer

5 Do you have access to the internet outside of school?

○ Yes ○ No ◉ No answer

Section 2 - Your use of the computer / laptop at home

6 In a typical week, how often do you use your computer/laptop outside of school?

- ○ Every day - more than 2 hours per day
- ○ Every day - up to 2 hours per day
- ○ 4 or 5 days per week
- ○ 2 or 3 days per week
- ○ Once a week
- ○ I do not use the computer/laptop every week
- ◉ No answer

7 When you use the computer/laptop outside of school, how often do you use it for each of the following activities?

	Over two hours per day	1-2 hours per day	0-1 hours per day	1-2 hours per week	1-2 hours per month	Never
Finding information	○	○	○	○	○	○
Email	○	○	○	○	○	○
Doing homework	○	○	○	○	○	○
Using the school VLE	○	○	○	○	○	○
Watching videos or listening to radio or other music	○	○	○	○	○	○
Social Networking (Facebook, Bebo, Instant Messenger etc)	○	○	○	○	○	○
Creating artwork, videos or music	○	○	○	○	○	○
Downloading music or filesharing	○	○	○	○	○	○
Playing Games	○	○	○	○	○	○
Other	○	○	○	○	○	○

8 Would you like to explain further what you use your computer/laptop for at home?

Section 3 - Attitude to ICT

9 In my ICT lessons...

	Every lesson	Most lessons	Some lessons	Rarely	Never
I know the lesson objectives	○	○	○	○	○
I am ready to start learning on time	○	○	○	○	○
I am able to achieve the learning objectives	○	○	○	○	○
I know my targets	○	○	○	○	○
I pay attention	○	○	○	○	○
I try to understand the work	○	○	○	○	○
I can complete the work	○	○	○	○	○
I know how much work I have to do	○	○	○	○	○
I learn new things	○	○	○	○	○
I enjoy ICT	○	○	○	○	○

10 At school...

	All the time	Most of the time	Some of the time	Rarely	Never
I know the lesson objectives	○	○	○	○	○
I am ready to start learning on time	○	○	○	○	○
I am able to achieve the learning objectives	○	○	○	○	○
I know my targets	○	○	○	○	○
I pay attention	○	○	○	○	○
I try to understand the work	○	○	○	○	○
I can complete the work	○	○	○	○	○
I know how much work I have to do	○	○	○	○	○
I learn new things	○	○	○	○	○
I enjoy school	○	○	○	○	○

11 When you use the computers/laptops in school in lessons other than ICT how often do you use it for each of the following activities?

	Every time we use the computers/laptops	Most times we use the computers/laptops	Some times we use the computers/laptops	Never
Finding information	○	○	○	○
Using the school VLE	○	○	○	○
Watching videos or tutorials	○	○	○	○
Using subject specific software (e.g. MyMaths)	○	○	○	○
Creating artwork, videos, animations or music	○	○	○	○
Creating artwork, videos, animations or music to show your learning in a topic (for example in Science)	○	○	○	○
Creating presentations using PowerPoint	○	○	○	○
Documenting work (e.g. writing a word document)	○	○	○	○
Working collaboratively with other students in your class	○	○	○	○
Working collaboratively with other people not in your class	○	○	○	○
Other	○	○	○	○

12 Would you like to explain further what you use computer/laptops for at school?

Section 4 - Attitude to the VLE

13 The school VLE (moodle)...

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
Helps me to learn	○	○	○	○	○
Helps us give feedback on each other's work	○	○	○	○	○
Is good for working with other students	○	○	○	○	○
Helps me think more about my own learning	○	○	○	○	○
Helps me to feel confident about my school work	○	○	○	○	○
Helps me to see where I need to do better	○	○	○	○	○

14 My e-portfolio (created using the VLE)...

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
Has made me more interested in my work	○	○	○	○	○
Helps me think more about my own learning	○	○	○	○	○
Makes me take more care with my work	○	○	○	○	○
Helps me organise my work better	○	○	○	○	○
Helps me to show people what I'm really good at	○	○	○	○	○
Gives me new ways of presenting my work	○	○	○	○	○
Helps me see where I need to do better	○	○	○	○	○
Helps me to plan how to improve	○	○	○	○	○
Helps me judge if I have improved	○	○	○	○	○
Is good for showing my progress to others	○	○	○	○	○
Helps me understand my work better	○	○	○	○	○
Helps me to learn	○	○	○	○	○

15 Would you like to explain further how you use the VLE or e-portfolios?

Questionnaire 3

Y10 VLE questionnaire

About you

1 Choose your gender

Choose...

2 Choose your tutor group

Choose...

3 Do you have access to a computer/laptop at home?

○ Yes ○ No ◉ No answer

4 Do you have internet access at home?

○ Yes ○ No ◉ No answer

Home use of ICT

5 When you use the computer/laptop outside of school, how often do you use it for each of the following activities?

	every day	once or twice per week	once or twice per month	occasionally, but not every month	never
Finding information	○	○	○	○	○
Email	○	○	○	○	○
Doing homework	○	○	○	○	○
Using the school VLE	○	○	○	○	○
Watching videos or listening to radio or other music	○	○	○	○	○
Social Networking (Facebook, Bebo, Instant Messenger etc)	○	○	○	○	○
Creating artwork, videos or music	○	○	○	○	○
Downloading music or filesharing	○	○	○	○	○
Playing Games	○	○	○	○	○

6 Please give more detail about what you use ICT for at home.

ICT lessons

7 In your ICT lessons:

	Every lesson	Most lessons	Some lessons	Never
I enjoy ICT lessons	○	○	○	○
I learn new things	○	○	○	○
I understand the work	○	○	○	○
I produce my best work	○	○	○	○
I use the VLE	○	○	○	○

8 Would you like to add anything else about your ICT lessons?

Using ICT in other subjects

9 When you use the computers/laptops in school in lessons other than ICT how often do you use it for each of the following activities?

	Every time we use the computers/laptops	Most times we use the computers/laptops	Some times we use the computers/laptops	Never
Finding information	○	○	○	○
Using the school VLE	○	○	○	○
Watching videos or tutorials	○	○	○	○
Using subject specific software (e.g. MyMaths)	○	○	○	○
Creating artwork, videos, animations or music	○	○	○	○
Creating artwork, videos, animations or music to show your learning in a topic (for example in Science)	○	○	○	○
Creating presentations using PowerPoint	○	○	○	○
Documenting work (e.g. writing a word document)	○	○	○	○
Working collaboratively with other students in your class	○	○	○	○
Working collaboratively with other people not in your class	○	○	○	○

10 Would you like to add anything else about use of ICT in other lessons?

About the VLE

11 The school VLE (moodle)

	Strongly Agree	Agree	Disagree	Strongly Disagree
Helps me to learn	○	○	○	○
Helps us give feedback on each other's work	○	○	○	○
Is good for working with other students	○	○	○	○
Helps me think more about my own learning	○	○	○	○
Helps me to feel confident about my school work	○	○	○	○
Helps me to see where I need to do better	○	○	○	○
Is something I would like to use more	○	○	○	○
Is something I would like all departments to use	○	○	○	○

12 Would you like to add any further comments about the VLE?

13 My e-portfolio...

	strongly agree	agree	disagree	strongly disagree
Has made me more interested in my work	○	○	○	○
Helps me think more about my own learning	○	○	○	○
Makes me take more care with my work	○	○	○	○
Helps me organise my work better	○	○	○	○
Helps me to show people what I'm really good at	○	○	○	○
Gives me new ways of presenting my work	○	○	○	○
Helps me see where I need to do better	○	○	○	○
Helps me to plan how to improve	○	○	○	○
Helps me judge if I have improved	○	○	○	○
Is good for showing my progress to others	○	○	○	○
Helps me understand my work better	○	○	○	○
Helps me to learn	○	○	○	○

14 Would you like to add any further comments about e-portfolios

Appendix C – Teacher Questionnaires

Staff questionnaire 1

Staff views of ICT

1 What is your current role at School?

Choose...

2 How many years have you worked in education/a school environment?

Choose...

3 What is your highest level of qualification in ICT/Computer Science or related subject?

Choose...

4 How would you rate your ICT skills in terms of...

	I am often asked to assist other staff	I can help other staff if required	I can do what I need to	I need help/would need help to do this
Creating documents using Word	○	○	○	○
Creating spreadsheets using Excel	○	○	○	○
Creating databases (Access or PHP/MySQL)	○	○	○	○
Creating presentations using PowerPoint	○	○	○	○
Web design	○	○	○	○
Multimedia Production	○	○	○	○
Programming	○	○	○	○
Using given software for admin purpose (e.g. register, reports etc)	○	○	○	○
Using the internet to find information / videos etc	○	○	○	○
Using the VLE	○	○	○	○
Troubleshouting hardware problems	○	○	○	○
Setting up hardware / building a computer	○	○	○	○

5 Considering computer/internet use outside of school, how often do you use it for each of the following activities?

	Over an hour per day	0-1 hours per day	1-2 hours per week	1-2 hours per month	Never
Finding information	○	○	○	○	○
Email	○	○	○	○	○
Shopping	○	○	○	○	○
School / job related work	○	○	○	○	○
Watching videos or listening to radio or other music	○	○	○	○	○
Blogging (creating own blog)	○	○	○	○	○
Reading blogs or web comics	○	○	○	○	○
Social Networking (Facebook, Bebo, Instant Messenger etc)	○	○	○	○	○
Creating artwork, videos or music	○	○	○	○	○
Downloading music or filesharing	○	○	○	○	○
Playing Games	○	○	○	○	○
Other	○	○	○	○	○

6 How often do plan / deliver the following computer based tasks for your classes. Please skip this questions if you do not teach or assist with teaching.

	Often	Sometimes	Rarely	Never	I don't know what this is	N/A
Finding information	○	○	○	○	○	⊙
Using the school VLE	○	○	○	○	○	⊙
Watching videos or tutorials	○	○	○	○	○	⊙
Using subject specific software (e.g. MyMaths)	○	○	○	○	○	⊙
Creating artwork, videos, animations or music	○	○	○	○	○	⊙
Creating artwork, videos, animations or music to show your learning in a topic (for example in Science)	○	○	○	○	○	⊙
Creating presentations using PowerPoint	○	○	○	○	○	⊙
Documenting work (e.g. writing a word document	○	○	○	○	○	⊙
Working collaboratively with other students in the class	○	○	○	○	○	⊙
Working collaboratively with other people not in the class	○	○	○	○	○	⊙

7 Would you like to explain further how ICT is used for teaching and learning?

8	How far do you agree with the following statements?			
		Strongly agree	Agree	Disagree	Strongly disagree
	The school has better than average ICT provision	○	○	○	○
	The use of ICT improves teaching and learning	○	○	○	○
	Problems with hardware and software are a common (at least weekly) occurrence for me	○	○	○	○
	Problems with hardware and software significantly affect my teaching and learning	○	○	○	○
	ICT provision has improved in the past 3 years	○	○	○	○
	I do not have enough time to learn how to use new technology to improve my teaching and learning	○	○	○	○
	I understand how to use new technologies to improve my teaching and learning	○	○	○	○
	I have access to all the hardware and software I need	○	○	○	○
	I know what hardware and software I need to improve teaching and learning	○	○	○	○
	I feel I get sufficient leadership concerning the use of new technologies to improve teaching and learning	○	○	○	○
	I feel I get sufficient training concerning the use of new technologies to improve teaching and learning	○	○	○	○
	Developing the use of ICT to improve teaching and learning is important for my subject area	○	○	○	○
9	Would you like to add any further comments about the school's ICT provision?				
10	Would you like to add any further comments about the use of ICT in terms of teaching and learning?				

Staff Questionnaire 2

Staff use of ICT Questionnaire

Questionnaire for staff concerning use of ICT to support teaching and learning, based on Becta's "21st Century Teacher" checklist.

Responses to this questionnaire are not anonymous. Results will be analysed and staff willing to be involved in further data gathering contacted. Individual respondent's answers will not be available, published or shared.

1 What subject(s) do you teach?

2 How long have you been in teaching?

○ NQT ○ 2-5 years ○ 6-10 years ○ 11-15 years ○ 16+ years ◉ No answer

3 What is your gender?

Choose...

4 In the last five years, have you taught discrete ICT as part of your regular timetable (i.e. ignoring any cover lessons)?

Choose...

5 In the last five years, have you been in a coaching group with a member of the ICT department?

Choose...

About you

6 Consider what you do towards developing your range of professional teaching skills with technology.

	Often	Sometimes	Rarely	Never
Do you use ICT to support your planning?	○	○	○	○
Do you use ICT to communicate information and concepts in high quality lessons?	○	○	○	○
Do you use ICT to explore complex ideas and information?	○	○	○	○
Do you use ICT to assess pupils?	○	○	○	○
Do you use ICT to track pupil progress?	○	○	○	○
Do you use ICT to store pupil data for formative and summative assessment?	○	○	○	○
Do you use ICT to analyse pupil data for formative and summative assessment?	○	○	○	○
Do you review your own ICT skills?	○	○	○	○
Do you review your use of ICT in terms of effective use in learning, teaching and management?	○	○	○	○
Do you include clear personal targets for ICT in your perfornace review / coaching?	○	○	○	○
Do you protect your personal information and professional status online?	○	○	○	○

7 Please explain how you embed ICT within your lessons to enhance teaching and learning

8 Please give any further information regarding the questions in this section, or leave blank if you have no further comments.

About Your Learners

9 Consider how you expose learners to a range of technologies and develop their skills to use them within their everyday learning.

	Often	Sometimes	Rarely	Never
Do you use ICT to provide solutions to support learners with SEN needs?	○	○	○	○
Do you assess your learners' ICT capabilities?	○	○	○	○
Do you use ICT to involve learners in their own assessment?	○	○	○	○
Do your learners have an understanding of e-safety and responsible online behaviour?	○	○	○	○
Do you consider the need to protect your learners' personal information (e.g. in mark sheets)?	○	○	○	○
Do you manage ICT flexibly to ensure your learners have access to a wide range of ICT resources in a variety of situations, when needed?	○	○	○	○

10 Please describe how you ensure all learners have personalised, creative and independent learning experiences when using ICT within your lessons

11 Please give any further information regarding the questions in this section, or leave blank if you have no further comments.

About Learning Beyond School

12 Consider how you and your school use technology to build dialogue and engagement with parents/carers, families and community.

	Often	Sometimes	Rarely	Never
Do you contribute to the school's vision for using ICT at school and at home?	○	○	○	○
Do you use ICT to communicate appropriate information with parents/carers (homework, news, events, etc)?	○	○	○	○
Do you provide parents/carers with information about their child via secure online access (reports, attendance, etc) ?	○	○	○	○
Do you help parents understand their e-safety responsibilities?	○	○	○	○
Do you share, with learners, the school's vision for using ICT at school and at home?	○	○	○	○
Do you use ICT to support and extend learning beyond school using the VLE?	○	○	○	○
Do you offer wider opportunities for learners to use ICT to continue and/or extend learning beyoud school (e.g out of hoursw access to ICT facilities)?	○	○	○	○

13 Please give any further information regarding the questions in this section, or leave blank if you have no further comments.

About Your Role in Your School

14 Consider your school plan and approaches to ICT as a whole-school issue.

	Often	Sometimes	Rarely	Never
Do you use ICT to communicate with colleagues?	○	○	○	○
Do you share your practice in ICT with colleagues?	○	○	○	○
Do your targets for ICT development inform whole school CPD?	○	○	○	○
Do you contribute to your department's self-review of its use of technology?	○	○	○	○
Do you contribute to your school's self-review of its use of technology?	○	○	○	○

15 Please give any further information regarding the questions in this section, or leave blank if you have no further comments.

***16** Would you be willing to help me with my research by being observed teaching using ICT? This will be for my use only; the observation would be for part of a lesson only (within a lesson chosen by you) and will not use grading criteria.

○ Yes ○ No

Appendix D – Parent Questionnaire

USE OF TECHNOLOGY AT SCHOOL – PARENTAL QUESTIONNAIRE

The school makes use of a range of technologies to support the educational aims and I have been conducting research, as part of my university study, into the use of these technologies. These include the Moodle-based VLE, MyMaths, IamLearning homework system and ParentPortal, for example. The purpose of this questionnaire is to acquire parent / guardian views on the use of these technologies. The results of this questionnaire will support those given by both students and teachers and will be published within my thesis. Completed questionnaires will remain anonymous and results will be aggregated for publication.

If you do not wish to answer a question, please leave it blank.

Access to Technology

Q1. Do you have access to the internet at home? Please indicate all the devices you use to connect to the internet, or check 'no access' as appropriate.

☐ Desktop computer ☐ Laptop ☐ Mobile devices (phone, iPad, etc.) ☐ TV or Games Console ☐ Other connection method ☐ No internet access

Use of school technologies

Q2. Please indicate how often your child makes use of the following at home. If you have more than one child at the school, please complete this with respect to your child currently in Y11.

	Often	Sometimes	Rarely	Never	N/A
VLE	☐	☐	☐	☐	☐
MyMaths	☐	☐	☐	☐	☐
IAmLearning	☐	☐	☐	☐	☐
Other educational web based services	☐	☐	☐	☐	☐
Educational mobile device apps	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

Q3. Please indicate how often **you** use the following at home, including where you work with your child or children.

	Often	Sometimes	Rarely	Never	N/A
VLE	☐	☐	☐	☐	☐
MyMaths	☐	☐	☐	☐	☐
IAmLearning	☐	☐	☐	☐	☐
Other educational web based service	☐	☐	☐	☐	☐
Educational mobile device apps	☐	☐	☐	☐	☐
Parent Portal	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

Q4. How useful you find these technologies to be for you and your child / children's education? Please give details below.

Q5. How far do you agree with the following statements?

	Strongly Agree	Agree	Disagree	Strongly Disagree
Using ICT at **school** is an important part of my child's education	☐	☐	☐	☐
Using ICT at **home** is important part of my child's education	☐	☐	☐	☐
It is easier for my child to complete homework if it is **not** ICT based	☐	☐	☐	☐
I can help my child with their homework more if it is ICT based	☐	☐	☐	☐
I prefer to contact the school using email / parentPortal etc. than through non-computer based methods (journal, phone, letter, in person)	☐	☐	☐	☐
It is important for my child to learn about e-safety at school	☐	☐	☐	☐
I prefer teachers to contact me via email rather than by phone	☐	☐	☐	☐

Q6. Would you like to add anything further about the use of ICT to support your child's education?

Thank you for your time in completing this questionnaire. Please hand completed questionnaires in to reception. If you would like any further details, or would like to contact me further about this questionnaire, please email me [email address].

Appendix E – Student Interviews

Interview 1:

Initial interview will be broken into three sections:

- Introduction
- Attitudes to ICT
- Attitudes to VLE

Discussions will be taped (with consent of students) and students will be made aware that all data generated will be analyzed for the purpose of the research. Students will be provided with resources required to complete the tasks – video camera, headphones & microphone and associated software.

Actions	Notes
students to introduce themselves to me and each other	Relaxed introduction, not all students known to me.
Introduction: • Explanation to students what research is; • Provide a summary of the research project • describe their role within my research; • explain what will be done with this research and the process for the data gathering throughout the academic year; • ask if students are happy to be recorded; • explain how anonymity will be assured; • explain that students will receive a transcript to 'check' their responses.	Informed consent; students may choose whether to take part.
Ask students in they have any questions.	

Actions	Notes
'thinking boxes' students to work in pairs / small groups and have 1 minute to write their thoughts on ICT without discussion. Each student then takes another 'turn' to add to others' thoughts or to expand their own.	Explore students' attitudes to ICT
Group discussion of themes from first exercise.	Students given chance to expand verbally on their ideas.
Students to work together to produce a 'talking heads' video "ICT is…"	Students to articulate attitudes to ICT by creating a video.

Actions	Notes
'wall wisher' activity identifying how students currently use the VLE	Elicit students ideas on how they use the VLE, using Web 2.0 functionality
Demonstrate functions of VLE students may not have experienced.	Develop student's understanding of purpose of VLE
'Voicethread' discussion on how the students would like to use the VLE in their learning	Web 2.0 tool that allows various media to be incorporated allowing students to present their ideas in a form suited to them.

Ending

- Explain that the workshop has ended
- Invite the students to make any further comments
- Reassure the students about any aspects of the process; e.g. anonymity, reporting of findings etc.
- Formally thank the students for their time, willingness to be involved and their answers.
- Remind the students that they will receive a copy of the transcript at a later date and may wish to amend or clarify their responses.

Second Student Interview

This interview will be broken into three sections:

- Introduction
- Attitudes to ICT, VLE and e-portfolios at home
- Attitudes to ICT, VLE and e-portfolios at school

Discussions will be taped (with consent of students) and students will be made aware that all data generated will be analyzed for the purpose of the research.

Actions	Notes
Welcome students and discuss general well-being	Relaxed introduction, put students at ease

Introduction: • recap to students what research is; including a summary of the research project and their role within my research; • invite students to read transcript of previous session and correct errors; • ask if students are happy to be recorded; • recap how anonymity will be assured; • explain that students will receive a transcript to 'check' their responses.	Informed consent; students may choose whether to take part. Re-affirm my role as researcher as different to teacher – to ensure student responses are made with as little bias as possible. Validity of data – checking of accuracy by participants
Ask students in they have any questions and invite students to leave if they do not wish to participate.	

Questions	Notes
Discuss use of ICT at home and comparative lack of use of VLE • what they use ICT for at home • how (if) this has changed throughout the year • why ICT use is different at home, than at school • how (if) their parents influence how they use ICT at home • why, given how much time is spent on the internet, they do not use the VLE more • why the use the VLE (when they do) • does the VLE helps them learn • what would encourage them use the VLE more at home	Explore students' attitudes to ICT and VLE use at home
Discuss use of ICT at school: • ICT (as a discrete subject) – what have they learnt this year • What do they think they should learn in discrete ICT • What would they like to learn/be	Explore students' attitudes to ICT and VLE use at school

taught • How (if) other subjects' use of ICT has changed throughout the year • What effect this change / lack of change has had on their learning • What activities they think best support their learning (in other subjects) • are any of the activities ICT based?	
Supplementary prompts if not covered in discussions above • What they use the VLE at school for • What VLE based activities they feel improve their learning • What VLE based activities they feel DO NOT improve their learning • How they have used the e-portfolio software • How (if) they feel the use of e-portfolio has improved their learning • What they have included in their e-portfolio and why • How they would like to develop their e-portfolios • What, if anything, would encourage greater parental involvement in using the VLE • How (if) they think KS3 students should make use of e-portfolios	Explore students' attitudes to VLE and e-portfolios if not previously addressed

Ending

- Explain that the workshop has ended
- Invite the students to make any further comments
- Reassure the students about any aspects of the process; e.g. anonymity, reporting of findings, my role as researcher etc.
- Formally thank the students for their time, willingness to be involved and their answers.
- Remind the students that they will receive a copy of the transcript at a later date and may wish to amend or clarify their responses.

Appendix F – Teacher Interview

Staff Interview

Introduction

- Welcome interviewee
- Provide brief summary of research project and how the interview will provide relevant information
- Explain use of tape recorder, invite interviewee to operate recorder and ensure respondent is happy to be recorded
- Explain how anonymity will be assured
- Explain that as a respondent they will be given a transcript at a later date to 'check' the answers given
- Ask if there are any questions, or would like clarification of anything said so far

Main questions	Notes/follow up questions
How long have you been in teaching?	Ice breaker
What is your current role?	Ice breaker
How do you make use of ICT in your role?	Explore ICT use / follow up with reasoning if not given
How do you make use of ICT in the classroom?	Explore ICT use / follow up with reasoning if not given
Where do you get your ideas from when designing ICT based activities?	Is this different from non-ICT based activities?
How do you rate the ICT provision within the school?	Explore ICT provision / follow up with reasoning if not given
How do you rate the ICT support within the school?	Explore ICT support / follow up with reasoning if not given
How do you rate the ICT management within the school?	Explore ICT management / follow up with reasoning if not given
What are you ICT based training requirements?	Explore training / follow up with how the school meets training needs
How / why do you the IWB?	Explore ICT use / follow up with reasoning if not given
How / why do you the Visualizer?	Explore ICT use / follow up with reasoning if not given
How / why do you the laptops?	Explore ICT use / follow up with reasoning if not given
How / why do you the VLE?	Explore ICT use / follow up with reasoning if not given
What is the impact on teaching standards of ICT use?	Explore teacher's beliefs about efficacy of ICT
What is the impact on learning standards of ICT use?	Explore teacher's beliefs about efficacy of ICT
What is your opinion on digital literacy?	Explore teacher's beliefs about efficacy of ICT
How does ICT fit in with subject curriculum as	Explore external policy (exam syllabus) effect

KS3/4 and 5?	
How does student's use of technology outside school fit in with teaching and learning of your subject?	Explore teacher's beliefs about efficacy of ICT
What would help you to make better use of ICT to support learning?	Explore teacher's beliefs about efficacy of ICT

Ending

- Explain that the interview has ended
- Invite the respondent to make any further comments
- Reassure the respondent about any aspects of the process; e.g. anonymity, reporting of findings etc.
- Formally thank the respondent for their time, willingness to be involved and their answers.
- Remind the respondent that they will receive a copy of the transcript at a later date and may wish to amend or clarify their responses.

Appendix G – SLT Interview

SLT Interview

Introduction

- Welcome interviewee
- Provide brief summary of research project and how the interview will provide relevant information
- Explain use of tape recorder, invite interviewee to operate recorder and ensure respondent is happy to be recorded
- Explain how anonymity will be assured
- Explain that as a respondent they will be given a transcript at a later date to 'check' the answers given
- Ask if there are any questions, or would like clarification of anything said so far

Main questions	Notes/follow up questions
How long have you been in teaching?	Ice breaker
What is your vision for ICT use within the school?	Ice breaker
How do you make use of ICT in your role?	Explore ICT use / follow up with reasoning if not given
How do you make use of ICT in the classroom?	Explore ICT use / follow up with reasoning if not given
How do you rate the ICT provision within the school?	Explore ICT provision / follow up with reasoning if not given
How do you rate the ICT support within the school?	Explore ICT support / follow up with reasoning if not given
How do you rate the use of ICT to support teaching and learning across the curriculum?	Explore ICT use / follow up with reasoning if not given
What is the impact on teaching standards of ICT use?	Explore beliefs about efficacy of ICT
What is the impact on learning standards of ICT use?	Explore beliefs about efficacy of ICT
What is your opinion on digital literacy?	Explore beliefs about efficacy of ICT / follow up with how digital literacy is integrated in literacy strategy
How important is ICT in promoting learning in all subjects?	Explore beliefs about efficacy of ICT
In terms of 'effective use of ICT' in the TEEP cycle; what do you look for in lesson observations as evidence of this?	Explore beliefs about efficacy of ICT
How important is ICT provision and use in departmental evaluation?	Explore beliefs about efficacy of ICT

How does the school move forward wrt the use of ICT to support learning?	Explore beliefs about efficacy of ICT

Ending

- Explain that the interview has ended
- Invite the respondent to make any further comments
- Reassure the respondent about any aspects of the process; e.g. anonymity, reporting of findings etc.
- Formally thank the respondent for their time, willingness to be involved and their answers.
- Remind the respondent that they will receive a copy of the transcript at a later date and may wish to amend or clarify their responses.

Appendix H – Observation Schedule

Year group: Subject: Brief description of activity: Hardware/software used:

Aspect of learning:	Doing	Thinking about connections	Thinking about concepts	Critiquing and evaluating	Creating knowledge	Sharing Knowledge
Explanation of aspects of learning: *Digital technology use:*	*Isolated information. Focus on completing a measureable task.*	*Connecting thinking. Simple connections made with a context. Compare and share.*	*Develop conceptual understanding of 'big ideas'.*	*Evaluating and critiquing to explore the limitations and potential of information, sources or process*	*Creativity – applying ideas, processes and/or experiences to develop a new reality*	*Sharing the new knowledge through authentic contexts and gaining feedback to measure value*
Accessing Information	Accessing: pictures, graphs, movies, data or information	Information from more than one sources in connected or compared in analysis	Information explicitly develops conceptual understanding	Information and sources are critiqued and evaluated	New conceptual understanding is developed building on or linking accessed information	The value of the product is determined by the quality and quantity of feedback from beyond the classroom environment. Learning occurs when the feedback is considered and analyzed.
Presenting	Present information using sound, pictures, video, words	Presented information has clear connections across formats or ideas	Presentation (or explanation of presentation) has explicit conceptual understanding	The presentation, methods and results are critiqued and evaluated	Critiqued and developed ideas or new knowledge is presented	
Processing information	Information is processed or data/images are manipulated in isolation	Connections are made between or within processed information / data or images and relevant concepts	Processed data or information has clear conceptual underpinning	Process and product are critiqued and evaluated	Ideas and new knowledge are developed	
Gaming or interactive programmes	Play a game Take a quiz Enter a virtual world	Links made between the game/quiz/virtual world and other knowledge	The relevant concepts within the game, quiz or virtual world are identified and explained	The game/quiz/virtual world is critiqued and evaluated within a conceptual context	Original ideas are used to create a knowledge product in any medium	

Appendix J – Glossary

Becta – (British Educational Communications and Technology Agency) was a government organization that oversaw ICT policy and procurement of IT infrastructure with the aim of promoting effective ICT use in schools. Becta was closed in 2011.

CPD – Continuing professional development.

HCI – Human Computer Interaction. HCI considers the user interface design and other aspects of the technology, along with user-level factor such as task, motivation and experience along with environmental and organizational factors and how these contribute to hardware and software design.

ICT – Information and Communications Technology. ICT is both a subject studied and a term encapsulating the hardware and software resources available within the school.

IWB – Interactive Whiteboard, a large interactive display connected to a computer and projector. The content of the computer is projected onto the interactive whiteboard and can be controlled using a stylus other similar device.

Key Stage 3 (KS3) – Key Stage Three, the stage of education for students aged between 11 and 14 including Years 7, 8 and 9.

Moodle – A VLE provider, more information can be found here: https://moodle.org

OfSTED – Office for Standards in Education, Children's Services and Skills. OfSTED inspect and regulate all services for children and young people, producing reports and recommending further action if needed. Schools are judged as Outstanding, Good, Needs improvement or Inadequate where judgements of Needs improvement or Inadequate will lead to further action.

SEN – Special Educational Needs; for example social, behavioural, physical or learning difficulties.

SLT – Senior Leadership Team encapsulating the head teacher, deputy-head teachers and assistant-head teachers. Other non-teaching posts such as the Director of Resources may be included.

TEEP – Teacher Effectiveness Enhancement Programme, more information can be found here: http://www.teep.org.uk

VLE – Virtual Learning Environment, a web-based e-learning environment that allows access to various resources.