

Benefits and Barriers: A case study to explore teaching and learning in physics using
a Collaborative Learning Platform.

Christopher Charles James Telfer-Mason

A thesis submitted in partial fulfilment of the requirements of the University of the
West of England, Bristol for the degree of Doctor of Education

Faculty of Arts, Creative Industries and Education,
University of the West of England, Bristol

December 2020

Acknowledgements

A year on after completing what I thought would be my final personal academic challenge, writing my Masters I received an email or as I saw it a call to arms to suggest the idea of studying for an EdD. After very little research into what it would entail other than it seemed a challenge worth taking, I enrolled and here I am today... what a challenge it has been. Working full time in a six days a week school whilst trying to raise my academic level to meet that of what is demanded throughout the course has been a challenge that at times I have doubted I would ever complete. However, as the final version of the thesis comes together this challenge nears the end.

Throughout the time of my studies Dr Dean Smart has been a tremendous supervisor, driving me on with his words of encouragement, reassurance and wisdom along with Dr Marcus Witt as co-supervisor. Both Dean and Marcus have been there whenever I have needed guidance or support offering vital ideas, references and lines of enquiry to consider, and for this and much more I am very grateful indeed.

Thank you to Aunt Lizzie, for her hours of proofreading and grammar checking!

Finally, I would never have been able to make it this far without the support of my wife, Charlotte, and the countless hours of her being by herself and probably wondering if I would ever finish. Well, she will soon have my full attention again if only for a moment before another challenge emerges...

Abstract

This is professionally focused case study research (Stake, 2005) which demonstrates pupil perceptions of the benefits and barriers to the collaborative learning of physics using a teacher-designed online learning platform.

'The case' is the researcher's professional setting: a physics department in a fee paying private college (secondary school) in southern England, with the qualitative approach and data sample formed from online questionnaires then participant interviews completed by year seven (Y7, age 11-12) pupils – new to studying the subject and this approach, and year twelve (Y12, age 16-17) learners who had opted to follow examination level physics courses, and whose past schooling had mixed 'traditional' learning and current learning was based on an innovative ICT based collaborative learning platform. Some sampling of selected teachers' views via individual interviews was also gathered as a way of ascertaining how well informed 'the adults' were of the children's experience and of their positionality.

Literature considered included methodology, methods, pedagogy and pupil voice focused research as well as an outline analysis of ICT policy at local (institutional) and national level. Data gathered was subjected to close scrutiny and thematic analysis (King, 2014) the first stage was using the online questionnaire data, followed by a second stage of the interviews/ transcripts which had been shaped in part by first stage analysis. Full anonymity for participants cannot be claimed as a simple web-search using the researcher's name would identify the setting, although individual respondents cannot be identified from the material and an ethical stance has been followed in line with UWE-BERA ethical guidance. (UWE, 2020).

The findings demonstrate younger pupils' early anxieties about whether working together is 'allowed' or is 'cheating'. There is growing awareness of the benefits of collaborative learning and the development of subject knowledge and skills. Older learners have been inculcated into seeing online materials as 'normal' and group working as routine - bringing gains and also challenges which they find easier to articulate.

The findings, data analysis and conclusions lead to a series of professional recommendations for teacher training and in-service practise around ICT based CLP as a learning tool.

Table of Contents	Page numbers
Acknowledgements	2
Abstract	3
Contents	4 - 7
Common acronyms used in the study	8
Chapter One: Introduction and background to the research study	
1.1 Chapter outline	9
1.2 My background as a teacher and researcher	9 – 10
1.3 The context of the school and its learners	10 – 13
1.4 Developing the research questions	14 – 15
1.5 Title and research questions	16
1.5.1 Where the research questions are addressed in the study	17
Chapter Two: Literature review	
2.1 Chapter outline	18
2.2 School's Policy on Innovation and collaborative learning	18 - 21
2.3 Introduction and Development of ICT in education	21 - 32
2.3.1 Pre 1990 – Introduction of information technology (IT) to the curriculum	22 - 23
2.3.2 1990 to 1997 – growth of IT in schools and the arising issues	23 - 26
2.3.2.1 A lack of funding	23 - 24
2.3.2.2 An inconsistent approach to delivering and teaching IT skills	25 - 26
2.3.3 1997 to 2000– IT to ICT	26 - 28
2.3.4 2000 to 2012 The barriers and benefits in developing ICT skills	28 - 30
2.3.5 Changing ideologies – back to the future?	31 - 32
2.4 Knowledge-based and skills-based approaches to learning	32 - 35
2.5 Innovating learning with ICT	36 - 53
2.5.1 Globalisation of learning though the use of ICT	38
2.5.2 Educational software, edutainment and gamification	39 - 42
2.5.3 Internet based learning with mobile devices	42 - 47
2.5.4 Virtual Learning Environments and social media learning platforms	48 - 49
2.5.5 Examples of using and learning with VLE	49 - 53
2.6 Collaborative Learning and Theories of collaborative learning	54 - 63
2.6.1 Why we use collaborative learning	54
2.6.2 Defining collaborative learning	55 - 56
2.6.3 Reasons for a collaborative approach	56 - 57
2.6.4 Learning theories and collaborative learning	57 - 61
2.6.5 Defining and linking collaborative learning to ICT in forming a CLP	61 - 62
2.6.6 ICT facilitating CL through sharing knowledge or enabling copying	62 - 63
2.7 Choice and design of the CLP	63 - 65
2.8 Blended learning	65 - 66
2.9 Summary of Chapter Two	67 - 68
Chapter Three: Methodology	
3.1 Chapter outline	69
3.2 Axiology, Epistemology and Ontology	69 - 75
3.2.1 My background as a researcher and teacher	69 - 70
3.2.2 Exploring axiology	71 - 72
3.2.3 Exploring ontology	73
3.2.4 Exploring epistemology	73 - 75
3.3 Research Methodology	75 - 88
3.3.1 Considering personal experience: Action research	75 - 76
3.3.2 Challenges in action research as a methodology	76 - 77
3.3.3 Evaluation	77 - 79
3.3.3.1 Challenges and strengths of evaluation as a methodology	78 - 79
3.3.4 Case study	80 - 88
3.3.4.1 Models of case study	81 - 85
3.3.4.2 Critiquing case study	85 - 88
3.4 Summary of Chapter Three	89

Table of Contents continued	Page numbers
Chapter Four: Research design and methods	
4.1 Chapter outline	90
4.2 Defining the case	90
4.3 Further background to the study	91 - 93
4.4 Case study design	93 - 95
4.5 Sampling	95 - 97
4.6 Questionnaires	97 - 101
4.9.1 The nature and design of questionnaires	97
4.6.2 Strengths and challenges with questionnaires	98 - 99
4.6.3 Strengths and challenges with online questionnaires	99 - 100
4.6.4 The design of questionnaires used in the study	100 - 101
4.7 Piloting	101 - 103
4.8 Using the online questionnaire to inform the study	103 - 104
4.9 Interviews	105 - 112
4.9.1 The nature and design of interviews	105 - 106
4.6.2 Strengths and challenges with interviews	106
4.9.3 Structure of interviews	106 - 108
4.9.4 Design of interview questions	108 - 109
4.9.5. Interview setting and good practice	110
4.9.6 Recording and transcribing interviews	110 - 112
4.10 Summary of Chapter Four	112
 Chapter Five: Research ethics	
5.1 Introduction to ethics	113 - 114
5.2 Ethics of insider research	114 - 116
5.3 Ethics of power relationships	117 - 118
5.4 Informed consent	119
5.5 Right to withdraw	120
5.6 Further ethical considerations	121 - 123
5.6.1 Safeguarding	121
5.6.2 Data storage and security	122 - 123
5.7 Summary of Chapter Five	123
 Chapter Six: Approach to qualitative data analysis and coding	
6.1 Chapter outline	124
6.2 Qualitative data analysis	125 - 126
6.3 Qualitative Data Analysis - Interpretive Phenomenological Analysis (IPA) and Thematic Analysis	127 - 128
6.4 Strengths and challenges of template analysis	129 - 130
6.5 Applying template qualitative data analysis using the formal analysis process	130 - 131
6.6 Preconceptions leading to the initial ideas of the a priori themes	131 - 132
6.7 An introduction and outline of thematic coding used in the research	133 - 135
6.8 Coding with data analysis software	136 - 138
6.9 An overview of coding with Quirkos	138
6.10 Data analysis steps used in the study and refining the template and a priori themes	139 - 143
6.10.1 Refining the a priori themes	139 - 140
6.10.2 The final a priori themes	141 - 143
6.11 Presenting the data – how to display data from the study	143 - 145
6.12 Summary of chapter six	145

Table of Contents continued	Page numbers
Chapter Seven: Data analysis online questionnaire	
7.1 Chapter outline	146
7.2 Analysing the data – Online questionnaire	147 - 160
7.2.1 Introduction to analysing the online questionnaire responses	147
7.2.2 Analysing the responses –background and confidence in CL and ICT	148 - 152
7.2.3 Analysing the responses – Collaborative Learning	153 - 158
7.2.4 Analysing the responses – innovation in learning and the CLP	158 – 160
7.3 Summary of emergent themes form the questionnaires	161 - 163
7.4 Key emergent themes from the questionnaire	163
 Chapter Eight: Data Analysis pupil and teacher interviews	
8.1 Chapter outline and introduction	164
8.2 Analysis the responses - investigating CL and the CLP	165 - 172
8.2.1 Question 1a	165 - 166
8.2.2 Question 1b	167 - 170
8.2.3 Teacher Question 1	171
8.2.4 Teacher Question 2	172
8.3 Analysing the responses - confidence in CL	173 - 180
8.3.1 Question parts 2a and b	173 - 174
8.3.2 Question 3a	175 - 176
8.3.3 Question 3b	176 - 178
8.3.4 Question 3c	179 - 180
8.3.5 Key emerging findings on CL from questions 1 to 3	180
8.4 Analysing the responses – ICT and the CLP	181 - 185
8.4.1 Questions 4a and 4b	181 - 184
8.4.2 Teacher Question 3	184 - 185
8.4.3 Key emerging findings on ICT and the CLP	185
8.5 Analysing the responses - perceptions and reactions towards the CLP	185 - 196
8.5.1 Question 5	185 - 187
8.5.2 - Teacher question 4	188 - 189
8.5.3 Question 6	190 - 193
8.5.4 Question 7	194 - 195
8.5.5 Key emerging findings on perceptions and reactions towards the CLP	196
8.6 Analysing the responses - professional implications	196 - 198
8.6.1 Teacher questions 5 and 6	196 - 198
8.6.2 Key emerging findings on professional implications	198
8.7 Pupils' language through the questionnaires and interviews	199
8.7.1 Key emerging findings on pupils' language	199
8.8 Summary of the findings from data analysis	200 - 202
8.8.1 Findings to suggest answers to research question three	200
8.8.2 Findings to suggest answers to research question four	201
8.8.3 Findings to suggest answers to research question five	202

Table of Contents continued		Page numbers
Chapter Nine: Conclusion and recommendations		
9.1 Chapter outline		203
9.2 Answering the research questions		204 - 208
9.2.1 Research question one		204 - 208
9.2.1.1 Recommendations and findings from research Q1.		208
9.2.2 Research question 2		209 - 211
9.2.2.1 Recommendations and findings from research Q2.		211
9.2.3 Research question 3		212 - 213
9.2.3.1 Recommendations and findings from research Q3.		213
9.2.4 Research questions 4 and 5		214 - 217
9.2.4.1 Recommendations and findings from research Q4		217
9.2.4.2 Recommendations and findings from research Q5		217
9.3 Limitations of the study		218 - 220
9.4 Own learning and further research recommendations		221 - 222
9.5 Research recommendations		223 - 224
9.6 Conclusion		225 - 226
9.7 Closing statement		227 - 228
9.8 Afterword		228
Word Count - 57,525		
Reference list		229 - 239
Appendices		240 - 279
Appendix A	Examples of screen shots from the CLP.	241 - 246
Appendix B	Letters sent to parents, pupils and teachers outlining the research study.	247 - 251
Appendix C	THE FREC UWE ethical permission form:	252 - 253
Appendix D	The online questionnaire – this contains a blank copy and two completed copy to demonstrate responses from Y7 and Y12 pupils.	254 - 260
Appendix E	The interview transcript – this contains a blank copy and three completed transcripts to demonstrate responses from a Y7, Y12 pupils and a teacher.	261 - 271
Appendix F	Screen shots of coding and data analysis from Quirkos.	272 - 275
Appendix G	This contains copies of the initial a priori themes, redefined a priori themes from after the questionnaire analysis and final redefinition of the a priori themes.	276 - 279

Commonly used acronyms in study:

ACP Academic Curriculum Policy

CL Collaborative Learning

CLP Collaborative Learning Platform(s)

IT Information Technology

ICT Information communication technology

KS Key Stage - with reference to the national Curriculum Key stage 3, 4 or 5
i.e. pupils in KS3 = 11 to 14 years old in this Y7, Y8 and Y9,
Pupils in KS4 = 14 to 16 years old in this Y10 and Y11
Pupils in KS5 = 16 to 18 years old in this Y12 and Y13

PBL Problem Based-Learning

PN Pupil number – used for displaying questionnaire and interview data

TN Teacher number – used for displaying questionnaire and interview data

VLE Virtual Learning Environment

Y Year - in relation to 'national curriculum years' schools year groups 7, 8, 9, 10, 11, 12 or 13 e.g. Y7

Chapter One: Introduction and background to the research study

1.1 Chapter outline

This chapter introduces the research study and reasons for the study taking place arriving at a point where the research questions are drawn up for the following investigation. The chapter gives context to myself, the school background, the school's academic policies and the learners at the school that informed the research.

1.2 My background as a teacher and researcher

When first considering a research proposal for my doctorate I began to focus on the changing nature of teaching since I had joined the profession in September 2009. In the first five years of my career, I had already experienced two educational institutions with differing views on pedagogy and the ways in which teaching and learning were promoted inside the classroom. Indeed, as I was due to select and complete a research proposal, I would be well established in a third school with a new set of educational values having been instilled in me.

My teacher training along with the experiences I had in the three institutions I had taught in had moulded me into the teacher I was at this point. The three schools had similar backgrounds being independent schools, with a mixed intake of pupils; offering a curriculum based on the national curriculum that suited their aims and ethos, enhanced by a rich co-curricular and sporting programme. There was one distinct link between each school and this was the ambitions of the school's senior leadership team. Each wanted to motivate pupils by ensuring teachers innovated in the classroom, delivering all aspects of the curriculum with a modern approach that would stimulate the pupils and create a desire to learn. Reflecting on the idea of a modern

pedagogical approach with innovation at its heart made me question my approach to teaching and learning.

The new school's teaching and learning policy promoted required teachers to develop two key areas within their practice: collaborative learning (CL) and innovative pedagogy using Information Communication Technology (ICT). I felt that teaching physics had always allowed my practice to incorporate some innovation around the use of ICT. Through my teacher training, subsequent experience in three schools and observations of colleagues as a subject leader, I had experience of how a wide range of ICT-based resources including animations, computing, data logging, experiments and software were used to aid learning. I considered the questions: was my teaching innovative? Did I truly inspire pupils in the classroom? Alternatively, did I need to teach in a different manner to innovate?

1.3 The context of the school and its learners

The school's background is as an independent selective, co-educational, boarding and secondary day school with 900 pupils on roll in Y7 to Y13. As an independent fee-paying school, the school does not have to follow the *National Curriculum* (DfE, 2013), which affords flexibility in its approach, as can be seen in the school's academic policy. A traditional curriculum is taught with the core subjects English, Mathematics and the sciences at its heart, with arts, humanities and languages as popular option subjects. The curriculum in the words of the Deputy Head Academic has been modernised by incorporating the additional subjects: careers, computing, debating, Latin, Mandarin, Science Technology Engineering and Mathematics (STEM) and Wellbeing that encompasses Personal Social Development and mental health awareness. Pupils are

also encouraged to take a full role outside the classroom in the arts, activities, drama, music and sports in what the school management hopes enables it to deliver an excellent all-round education.

The *Academic Curriculum Policy* (ACP) (School X, 2017, p.1) outlines the stated aims of the school's curriculum

To provide excellent all-round academic opportunities and by teaching pupils to aim for excellence yet value both achievement and endeavour. We ensure that all pupils have exceptional opportunities to learn and make progress.

The school annually reviews its curricular provision in order to maintain a modern and stimulating curriculum that offers

...excellent preparation for the opportunities, responsibilities and experiences of adult life. (School X, 2017, p.1).

The ACP interconnects to two further school policies: the ICT and e-Learning policy (School X, 2017) and the *Teaching and Learning policy* (School X, 2017). The three policies together set out the school's aims for the curriculum, teaching and learning practices and the development and incorporation of ICT across the curriculum.

In the past two years, to further modernise teaching and learning within the curriculum the school has heavily invested in new ICT equipment, equipping new ICT suites and providing tablet computers for individuals in Y7 to Y9. A Director of Learning and Innovation and the Head of e-learning were appointed to aid staff development, the development of teaching pedagogy and to develop ICT in the curriculum.

The APC states:

The school is committed to using educational technology and ICT to improve further the learning experiences and achievements of all pupils. (School X, 2017, p.2)

This is echoed in the ICT and e-learning Policy (School X, 2017, p.1) and the *Teaching and Learning* policy (School X, 2017), as stated by the school management's belief that the use of ICT will enhance everyday teaching and learning. To develop these skills the school has taken the following steps, as set out in both policies:

- Introduction of a Director of Learning and Innovation and a Head of e-learning
- ICT/Computing lessons are compulsory in Y7, 8 and 9
- Y7 to Y9 have individual school iPads
- A new school Digital Diploma for Y7 pupils
- Each department has an ICT representative
- ICT skills are incorporated into each department's schemes of work.
- A study skills programme that runs alongside the curriculum to promote different approaches to learning such as CL and Digital Skills.

Speaking to the Deputy Head Academic, he explained the rationale for the introduction of the diploma and ICT skills incorporated into departmental schemes of work. He explained these were measures to continue to build pupils' ICT skills,

“Preparing them for adult life outside of school whether that is at university or in the workplace.” (Interview with Deputy Head Academic, 2017)

He continued:

“The focus is to ensure pupils can use ICT in an appropriate and safe manner to carry out work but also to understand when it is not appropriate to use it.”

By incorporating ICT into the curriculum, he hoped that it is a means for teachers to:

“Develop their teaching pedagogy beyond the traditional methods with the idea of innovation and doing things that were not previously possible”.

However, with an understanding that not every lesson or subject will need to use ICT all the time or sometimes not at all.

This reflects the ICT and e-learning policy that states

‘ICT can aid innovation allowing teachers to go beyond more traditional methods of teaching providing resources and creating new types of learning environments for pupils.’ (School X, 2017, p. 2)

He finally explained the point of the ACP and drive behind innovation with ICT, as the focus was to ‘improve teaching in the classroom to improve pupils’ examination results.’

Speaking to the Director of Innovation and Learning, he explained the purpose of innovation as set out in the ACP was to:

“Provide a chance for teachers to improve teaching practices and the learning experiences for pupils whilst extending them beyond the curriculum.”
(School X, 2017, p.2)

He believed innovations such as collaborative learning, group work, relating ideas to real life/everyday situations or the use of ICT and educational technology were ways that could help achieve the set-out goals. He felt these ideas offered a modern approach rather than the use of traditional teaching methods.

1.4 Developing the research questions

My experiences as a teacher combined with my reflective approach and the approach of the school to build a curriculum based on incorporating new teaching practices (outlined in section 2.2) with a modern curriculum led me to my initial ideas of a doctoral research project. The direction of school X's ACP led to the questions I asked at the end of section 1.2: was my teaching innovative? Did I truly inspire pupils in the classroom? Alternatively, did I need to teach in a different manner to innovate?

This presented an area where I could develop my own practice whilst researching how I could innovate through teaching physics to broaden my use of ICT whilst incorporating it with CL, an approach that is seen as innovative (OECD, 2016). As stated within my own teaching practice I used ICT where I felt it was beneficial to pupils and I had also experience of using CL approaches for different types of group work. Both CL and the use of ICT fitted into the school's ACP and in the way that the Deputy Head Academic and Director of Learning and Innovation stated teachers should innovate in their practice.

I wanted to find a way to combine the approach of CL with ICT to be able to investigate the possible benefits or barriers this may have when used in teaching physics. I began by researching ICT, quickly moving to look at the idea of virtual learning environments (VLE) and how these had been used both in and out of schools to provide online learning resources. I also found out how new mobile technologies such as tablets and phones were becoming increasingly more common methods of accessing educational content alongside ICT and allowed pupils to share educational content easily. Indeed, further research as explained in section 2.4 demonstrated how social media and messaging was enabling pupils to work together quickly and from distant locations.

Combining the ideas of using a VLE to provide educational resources and ICT to facilitate communications between pupils enabled the production of what was termed in this research as a Collaborative Learning Platform (CLP). The notion of a CLP within the setting of a secondary English school is explained through Chapter 2 and answered in section 2.5.5 developing an answer for research questions one. The design of the CLP and reasons for using a CLP with each year group rather than the school's VLE are explained through section 2.6 in the literature review. The CLP were then used alongside my usual teaching in lessons for Y7 and Y12 (the choice of which is explained in Chapter 4); indeed the Y7 had experience of a digital curriculum as they had, and regularly used, one-to-one tablet devices in different subjects. For the Y12 pupils it would be different as they did not have school one-to-one devices and their teaching had been through a more traditional curriculum so would mean some changes that I appreciated could cause apprehension. However, I believed that this approach would benefit pupils by offering transferable skills through developing their uses of communication, ICT and teamwork whilst also enabling them to learn how to support and learn from one another.

1.5 Title and research questions

During the initial taught stages of my doctorate and in designing my research proposal I was able to investigate concepts surrounding: CL, educational policy, ICT, learning theories, professional identities and theoretical perspectives of teaching and learning that related to these areas. This time allowed me to understand the manner in which there had been a shift in teaching pedagogy since I came into the profession and indeed since the introduction of ICT into education through the national curriculum in the late 1980s. With this in mind, it helped to further establish the mechanism of incorporating CL with ICT using CLP in teaching physics. This enabled me to set out my title and research questions outlined below.

Title

Benefits and Barriers: A case study to explore teaching and learning in physics using a Collaborative Learning Platform.

Research questions

1. What is meant by 'Collaborative Learning Platforms (CLP)' as a notion in English school ICT?
2. Why is innovation using ICT being encouraged as policy in the case school?
3. What are the uses of CLP as a teaching tool in the case school?
4. Perceptions and reactions: what are users' attitudes to CLP?
5. What are the professional implications of this?

1.5.1 Where the research questions are addressed in the study:

Research questions one and two are addressed through Chapter 2 in the literature review, followed up by a summary and recommendations in Chapter 9

Questions three, four and five are addressed through the data presented and analysed in Chapters 7 and 8, with references drawn from the literature review, followed by a summary and recommendations in the conclusion in Chapter 9.

Chapter Two: Literature Review

2.1 Chapter outline

This chapter sets out the literature around the background of the study, setting out to provide a review of traditional and modern or innovative approaches to teaching and learning; local, national and global influences on education policy; and how ICT has been transformative in education since 1990. The literature outlining the methodology of case study is found in Chapter 3 and literature on qualitative methodology is found in Chapter 4.

2.2 School's policy on innovation and Collaborative Learning

The school's ACP outlined the curriculum along with teaching and learning approaches for staff to follow. This, combined with the discussions with the Deputy Head Academic and Director of Innovation and Learning, highlighted the need for teachers to innovate through combining new modern or technological approaches with more traditional approaches to teaching and learning. This posed the question: what are traditional approaches and what are new, modern or innovative approaches?

The Director of Innovation and Learning defined traditional approaches to teaching and learning as teacher led, including examples such as teacher-led discussion, teacher pupil interaction, and the use of presentations or use of demonstrations performed by the teacher that aided learning in the classroom. Indeed Plevin (2017) defines traditional approaches as methods led through face-to-face interactions by teachers that incorporate demonstrations, explanations and presentations. These ideas were reflected in the OECD's (2016) research into innovation in education when qualifying what traditional teaching methods were in relation to innovation.

In the announcements that proceeded the Conservative Government's *National Curriculum* in 2013/14 (DfE, 2013) the then Education Minister stated a move back to a knowledge-based, teacher-directed curriculum. Indeed, speeches from Gove (2014) and Gibb (2015) explained this ideological shift from a skills-based back to a knowledge-based curriculum. However, in slight contradiction within the curriculum there was still a call for the development of skills such as digital skills. The school also recognises the need for pupils to develop transferable skills such as communication and collaborative skills that will be needed by them in the future; this is further explored in section 2.4.

The school's policy therefore seeks to combine the ideas of traditional and modern/innovative teaching to provide the best of both ideologies. The school's management listed new modern or innovative approaches in teaching and learning through the ACP (School X, 2017) as using: collaborative learning, flipped learning, group work, relating ideas to real life/everyday situations or the uses of ICT and educational technology to aid learning in the classroom. The OECD's (2016) research defines innovation as 'the implementation of a new or significantly improved product, service or process' (p.22). Within an educational context or setting, they deem the following as examples to modify the definition above. An example of the product can be a new syllabus, textbook or resource; a new process can be the use of ICT in e-learning or a new process may be communication via communication through ICT or collaborative learning. They further state that:

These new practices are intended to improve the provision of education in one way or another, and therefore innovations in education should be regarded as "improvements". (OECD, 2016, p.23)

The Deputy Head Academic stated that innovation within the school's curriculum was to improve teaching and the examination results.

It is clear from the policy documents that the school has put in place a series of measures to ensure that its policy dictates that the main form of innovation is the use of ICT. Teachers are actively encouraged through policy and departmental schemes of work to innovate using ICT, creating digital resources, collaborative learning environments where pupils can work together or research tasks to complete assignments or homework both in school and from their homes.

He also explained that in order to allow pupils to access these types of tasks ICT lessons and lessons within the curriculum cover the basic digital skills required.

As listed in the e-learning Policy the skills required are:

- using a computer or tablet device for a specific task or tasks
- the use of emails for communication
- use of Office 365 software package (including MS Word, Excel and PowerPoint)
- independent learning through the school's Virtual Learning Environment (VLE): Firefly
- research skills
- touch-typing
- the use of ICT and the tablet device for day-to-day organisation.

The policies demonstrated how the school encourages teachers to reflect upon their teaching practice and look to innovate where it may benefit the pupils, which follows the ideas outlined in the Measuring Innovation in Education report (OECD, 2016). The policies also establish the support in place for both pupils and teachers to develop the

necessary skills to allow them to access ICT and be able to use this in teaching and learning.

CL is also focused on in the Teaching and Learning Policy (School X, 2017) and appears within the other two policies. The Deputy Head Academic explained this was an area for development identified from a previous inspection and so the senior leadership team wanted this to be focused on through teaching and learning. The Director of Learning and Innovation mentioned this as an area that could provide help with innovation in teaching as alluded to by the OECD (2016) study. He believed that it offers pupils transferable skills through communication and teamwork whilst also enabling them to support and learn from one another.

2.3 Introduction and development of ICT in education

The policies mentioned in section 2.2 outline how the school's management wishes to innovate and incorporate ICT within teaching and learning. Gaining an insight into how these policies were formed required an understanding of how ICT came into education and the impact it has had on teaching and learning. Throughout the thesis computing, information technology (IT) and information communication technology (ICT) are referred to as ICT. In this chapter the narrative dictates the use of IT prior to ICT in order to demonstrate the changes that were implemented through this move and the broadening through this ideological transition.

2.3.1 Pre-1990 – Introduction of information technology (IT) to the curriculum

In building an understanding of the importance of ICT in the 2013 *National Curriculum* (DfE, 2013) and innovation using ICT in the school's curriculum I traced the emergence of ICT in education back to the late 1980s. Although some schools did have computers, the first policy that saw the induction of ICT was the Technical and Vocational Education Initiative (TVEI) (DfES, 1988). Through the TVEI scheme schools were supported to develop pupils' computing skills across the curriculum with the aim of ensuring they had these skills and knowledge for their future. Although the scheme was backed by industry, it appeared that not all schools were provided with the equipment, expertise and staff training required to make this a success; indeed, these issues continue to hamper the use of ICT in schools to the present day.

The *Education Reform Act of 1988* (DfES, 1988) was the first educational policy to highlight the need for pupils to develop transferable digital skills through the introduction of Information Technology. This Act (DfES, 1988) sought to establish the use of computers in the classroom with the aim of assisting the improvement of literacy and numeracy. Interestingly, this is the almost exact statement that now appears in the *National Curriculum 2013* (DfE, 2013). The reason for the Act (DfES, 1988) was to ensure that pupils leaving schools had computational skills, which would be transferable to higher education, university or future employment that would benefit the economy with growth in new digital sectors.

The Reform Act also saw the introduction of funding per capita; this, as Garratt and Forrester (2012) explain, led to schools competing for pupils, which in turn could determine budgets for purchasing resources. The funding changes meant that not all schools could purchase the ICT equipment necessary to achieve the targets set out;

and, as seen in the next sections, it led to a loss of confidence in ICT through poor procurement and training.

2.3.2 1990 to 1997 – growth of IT in schools and the issues arising

The *Impact Report* (Watson, 1993), *Warwick Evaluation* (National Curriculum Council 1994) and *McKinsey Report* (McKinsey, 1997) all demonstrated the growing use of IT across all sectors of education and the curriculum between 1990 and 1997. The *Impact Report* (Watson 1993) and *McKinsey Report* (McKinsey, 1997) highlighted the benefits IT had on pupils' education, citing the development of their skills and the difference made by being provided with good resources including computers and computer-based learning resources. However, despite the reported benefits to pupils contained in the reports, the key findings of the reports listed above raised two major issues: a lack of necessary funding and the inconsistent approaches to using IT in teaching and learning across the curriculum.

2.3.2.1 A lack of funding

The *Impact Report* (Watson, 1993), *Warwick Evaluation* (National Curriculum Council 1994) and *McKinsey Report* (McKinsey, 1997) all highlighted funding as an issue that was detrimental to the possible uses of IT in schools. Indeed, all fourteen reports commissioned by the Conservative or Labour Governments between 1990 and 2000 mentioned a lack of funding holding back pupils in learning through IT. Over the course of the decade following each report, there was a shift in education policy and a promise of further funding as could be seen from the *Education Acts* of 1994 and 1996 (McKinsey, 1997). However, this lack of funding and disparity in funding between the public and private sectors meant that not all schools had the correct equipment

required to teach IT skills to the same level. The lack of funding also meant the correct training was not being delivered to all staff; there was a shortage in technicians to support teachers that meant the policy was failing to see all pupils achieve the levels of skills desired (National Curriculum Council, 1994 and DfEE, 1999).

Government initiatives to try and solve the funding issues were sponsorship programmes (Watson 1993) through industry with the aim of fostering links between pupils and potential employers, as well as seeking another revenue stream to fund new equipment and resources. This again reflected the Government's desire to boost skills and ensure these could be used to help develop economic benefits in the future. Watson (1993) cited the difference made by this sponsorship scheme in providing the resources to aid learning and development of IT skills. An additional benefit of this new funding was the creation of City Technology Colleges, launched with the aim of encouraging 'pupils to seek a future in science or technology' (Garratt and Forrester 2012, p.52) that once again had intended economic benefits.

Reflecting on my own experiences in the independent sector, I have witnessed the disparity in funding and training between the schools that I have worked in. The current school that I work at has placed a higher significant importance on ICT in the curriculum along with high levels of funding and teacher training, as can be seen in the ACP (School X, 2017) when compared to my previous schools. As demonstrated in the reports, it was not just the state sector that suffered from different levels of funding and training; these issues were and are still prevalent across all schools.

2.3.2.2 An inconsistent approach to delivering and teaching IT skills

The *Dearing Review* (1994) picked up on the ideas raised by Watson (1993) and the *Warwick report* (National Curriculum Council 1994) citing the lack of consistency in the approach to teaching IT for the absence of students' basic skill; indeed this was present in all fourteen reports that I reviewed. Dearing's key message that was repeated throughout the report was the need for all students to have 'a basic competence in the use of information technology' (Dearing 1994, p.12) that was a minimum requirement. The *Stevenson Report* (Stevenson, 1997) suggested that in order to rectify this situation and ensure this minimum requirement, a national strategy should be implemented, which would focus on equipment, training and the uses of IT in the curriculum. It was not just the pupils' skills that were not to the required levels but also the funding issues previously described that caused the varying abilities of teachers to use and teach the pupils these skills. The report also discussed pupils' views highlighting the range of confidence and levels of skills they held.

Stevenson's (1997) idea was for a national strategy built upon the foundation of national policies, which had previously been introduced, but as Forrester and Garratt (2012) argued, even with a policy in place it is still open to interpretation by the users, which can lead to inconsistencies, as had been seen before (National Curriculum Council 1994). Ball et al. (2012) discuss conflicts and misinterpretations as being the main issue when implementing a new policy, something which had been seen before by Watson (1993) and again in McKinsey's (1997) report. In order to overcome this, Bell and Stevenson (2006) call for a need for strong leadership on a local and national level, which Gunter (2012) says is critical to understanding and implementing policies correctly.

My own experiences reflect the concerns raised in the literature above. In the three independent schools I have taught in I have been only too aware of the varying levels of ability, confidence, training and use of pupils' and teachers' ICT skills. Indeed, the subsequent reviews mentioned, moving from the 1990s to the present day, all come back to focus on the issues caused by a lack of funding and training and the inconsistency in approaches to implementing and teaching ICT as factors leading to skills gaps.

2.3.3. 1997 to 2000 – Information technology to information communication technology

Arguably the biggest change in the educational use of IT took place through the *Curriculum 2000 Review* (DfEE 1999) following the General Election in 1997 where Labour came into power. The subsequent launch of the *Curriculum 2000* (DfEE 1999) saw an ideological shift from the previous knowledge-based curriculum to a skills-based curriculum. Digital skills were at the centre of this curriculum as ICT became a core subject along with a name change for Information Technology becoming Information Communication Technology (ICT). The name change suggested by Stevenson (1997, p.12) reflected 'the increasing role of both information and communication in all aspects of society'.

This stemmed from the technological revolution that was taking place at the end of the 1990s which saw the introduction of broadband internet connections for homes and schools (DfEE, 1999) with the aim of further benefit to the economy. This perfectly reflects Bernstein's (2001) views of educational policy as a total pedagogised society, which is driven equally by media and culture. The new culture was the ability to

communicate and share information not just locally but nationally and even globally and it was of critical importance to ensure pupils had the skills to access and use this wide range of information and resources. This was the beginning of the internet age, a tool which Stevenson (1997) believed would revolutionise education, with new technologies enabling children to learn faster, enhance career prospects and benefit the economy with new careers.

The *Curriculum 2000* (DfEE, 1999) suggested that the Government had listened to the reports from McKinsey (1997) and Stevenson (1997) that stated the lack of funding meant the UK's education system was falling behind other leading nations in the use of ICT in the National Curriculum. The Government's reaction of broadening the use of ICT across the curriculum, implementation of digital skills, training schemes for teachers and significant high levels of investment demonstrated the seriousness with which they addressed the issues. The new National Grid for Learning (NGfL) reflected this as the flagship big budget project that hoped to re-establish the quality and quantity of ICT available in schools. The aim of this project was to push internet technologies and use this link between the classroom and home to further develop students' skills and education, seeing in total £3.5 Billion invested in schools' ICT.

Despite this investment along with further projects, there was still a disparity in the availability of ICT resources and indeed staff trained to implement the effective use of ICT. It was not just the state sector where these problems existed with different funding models and staffing; the independent sector suffered similar problems. As Youni (2006) explained, there was still a lack of parity in the provision of ICT across all schools following the implementation of the *Curriculum 2000* including the skills pupils were being taught.

This lack of parity suggested that once again funding was not being used correctly to ensure support training and staff development were put in place to aid the implementation of policy, as the *Fulfilling the Potential Report* (DfES 2003) stated. Technical issues such as 'reliability, connectivity and a lack of technical support' (DfES 2003: 3) meant schools still could not use all the equipment which was in place. As Day *et al.* (2000) highlight, funding can greatly affect the success of a policy being implemented correctly, which begged the question whether the Government or policy makers had learnt from previous reports. As McKinsey (1997) and Stevenson (1997) explained, the need for support and planning to back up the investment in equipment was a major concern in the initial implementation of IT strategies during the 1990s.

Despite the issues raised, the *Fulfilling the Potential: Transforming teaching and learning through ICT in schools* report (DfES 2003) did demonstrate the progress that had been made and pupils' views that expressed improvement in ICT provision and skills they had developed. Indeed, the new internet technologies seemed capable of providing transformation and aiding teaching and learning.

2.3.4 2000 to 2012 – The barriers and benefits in developing ICT skills

The government's *Fulfilling the Potential: Transforming teaching and learning through ICT in schools* (DfES 2003), highlighted the positive progress in the development of pupils' skills made from the introduction of ICT policies related to Curriculum 2000 and *Education Acts* of 2002 and 2004 (DfES, 2004). The 2004 Curriculum (DfES 2004) sought to develop pupils' ICT skills again further with the introduction of four mandatory key skills: analysing, interpreting, evaluating and presenting work using ICT (DfES, 2004). These skills, along with the promotion of problem solving, enquiry

and decision-making skills, again demonstrated the move away from the knowledge-based curriculum to a curriculum focused on the development of skills.

Moore (2004) highlighted this positive progress reflecting on pupils' and teachers' perceptions of increased engagement and motivation, development of ICT skills across different subjects and using ICT to foster independent learning. His research highlighted how pupils and teachers felt they could do things using ICT that they could not do within using more traditional methods. This was further suggested by Beck and Wade (2004) commenting that over the course of this decade ICT technology in education was transformed through technologies. According to Veenstra *et al.* (2009) and Van de Walle *et al.* (2010) these were opening the world of education allowing innovation using communication across the internet and mobile devices, internet platforms and new interactive multimedia softwares. Despite these positive statements and the Government's desire to push ICT skills across education, there were several barriers emerging.

Pasquainelli (2010) raised the concerns of some students who opposed the use of ICT, believing that learning activities using ICT may not be as viewed as seriously as when using other more traditional learning activities. These pupils' perceptions explained that the use of ICT was a potential barrier to learning and that they felt it could negatively impact their learning. Somekh *et al.* (2002) also raised concern of how teachers felt that when used ICT in other subjects as it could have a negative effect on literacy and numeracy. This was through a belief of missing out on teacher led or traditional approaches that would develop literacy and numeracy skills.

Childs *et al.* (2012) research reflected these ideas and argued that issues arising using ICT could be detrimental to the learning, a point highlighted by Wurst *et al.* (2008 cited by Annan-Coultas 2012). They found that students' negative perceptions of ICT

related to lost learning time from technical issues or ICT serving as a distraction enabling off-task behaviour. Jedeskog and Nissen (2004) described off-task behaviour as distractions caused by increased connectivity through the internet that allowed web surfing or chatting to other pupils via the internet. Despite the aim of ICT improving how pupils could learn collaboratively through expanded communication, this was now adding to possible distractions in the classroom.

This lost learning time was not new and had been previously mentioned through *The Dearing Review* (1994) and *The Stevenson Report* (Stevenson, 1997) and various Government reports (DfEE, 2003) since 1988. As Moore (2004) and Childs *et al.* (2012) state: technical issues, low specification equipment, lack of availability of ICT and the familiarity of staff in using ICT all were still contributing factors to a lack of pupil engagement and lost learning time. These potential issues that could arise from ICT were expressed by Geoghegan's (1994, cited by Annan-Coultas 2012) argument from over 20 years ago. He felt it would be hard to fully integrate ICT into education as there would be shortages of equipment, not enough support and unrealistic expectations, all of which are all reflected in the issues with ICT above.

As is suggested by the research literature above, research into ICT in education is contradictory, as several studies or reviews demonstrated the barriers and others produced the benefits of its use. It was clear from government policy makers' views and the continued championing of ICT through curriculums since such as the *National Curriculum and Strategies* (DCSF 2009) or *National Curriculum 2014* (DfE, 2013) that ICT would continue to be incorporated into the curriculums.

2.3.5 Changing ideologies – back to the future?

The changing government from Labour to the Conservative–Liberal Democrat coalition and then to the Conservatives saw further reviews in educational policy. At this time the framework for the National Curriculum 2014 (DfE, 2013) was developed following reviews leading to *The National Curriculum in England Framework Document* (DfE, 2013). Policy saw ICT replaced with Computing, then becoming Computer Science at GCSE and A-level, reflecting the initial ideas of the late 1980s and early 1990s seen in the TEVI. The aim was to ensure pupils had knowledge of ICT skills that would be required for their future taught through a Computer Science course designed with an emphasis on ‘teaching principles of computational thinking and programming skills’ (DfE 2013, p.8). Although Computer Science is an optional subject at KS4 and KS5, there are compulsory components existing at KS 1, 2 and 3. This is with the mandatory use of ICT/computer science across all curriculum subjects, to ensure development of pupils’ skills and to be prepared for a digital future.

Introducing a focused approach to coding and the development of technologies which Gove (2014) claimed would be more ambitious and rigorous than ICT. Whilst providing ‘fundamental knowledge and skills needed to create new digital technology products’ (DfE 2013, p.8). This was reminiscent of the language used to describe the knowledge-based curriculum in *1988 Educational Act* (DfES, 1988) and the reasons behind the introduction of the TVEI (DfES, 1988) with its original goals of the development of computational skills in the curriculum. The speeches of Education Secretaries Gove (2014) and Gibb (2015) along with the Curriculum reviews of 2011 and 2013 (DfE, 2013) demonstrated the shift in the Government’s ideological position. This was a move away from the more skills-based curriculum introduced in 2004 with

the promotion of problem solving, enquiry and decision-making skills back to a knowledge-based curriculum.

2.4 Knowledge-based and skill-based approaches to learning

The contrasting ideological standpoints of different Governments are demonstrated through the opposing *Curriculum 2000* (DFES, 1999) and *Curriculum 2014* (DfE, 2013) along with the associated reviews that sought to determine and shape these curriculums. This opens the debate between the arguments for and against either a knowledge-based or a skills-based curriculum as the foundation for the curriculum. As explained in section 2.1 my current school seeks to hold the middle ground with a curriculum that allows pupils to develop both their knowledge and skills. As an independent school it has the liberty to administer and choose its own curriculum, so this raises the question of whether it is right to take this path.

The aim of the skills-based curriculum is to include a breadth and depth through teaching to all pupils to develop their knowledge alongside the development of related skills (Larmer *et al.*, 2015). An example explained by Kidd (2018) outlines how pupils could develop map reading skills whilst learning how the Roman Empire grew across Europe. Not only would the pupils learn the facts or gain knowledge, but also develop their map reading skills by charting the rise of the Empire across Europe. This was the approach taken by Labour's *Curriculum 2000* (DFES, 1999), where the curriculum sought to not only develop knowledge but to subsequently link the gaining of this knowledge with the development of several learning skills that included: analytical, critical thinking, ICT, independent learning, mathematical and problem-solving skills across all curriculum subjects. Cooper and Murphy (2016) describe how Project-Based Learning (PBL) can be a model of skills-based learning that allows pupils to

develop curriculum knowledge and skills. Cooper and Murphy (2016) explain how pupils work collaboratively over a period of time to solve a real-world problem allowing them to develop the skills listed above and their knowledge across subjects. Larmer *et al.* (2015) argue that if PBL is used correctly it can improve pupils' motivation and knowledge; test results; and develop their skills across the curriculum.

Certainly, the literature from reports and reviews during the early 2000s argued skills-based learning was working and echoed Larmer *et al.*'s (2015) thoughts. Within the reports and reviews there were also thoughts and suggestions of how the practice could be improved and recommendations to drive up standards and resources across the curriculum. The question of whether it worked is more complex as the literature mentioned above focuses on the positives; however, with a change of Government in 2010 came a change in recommendations through education reviews that highlighted significant issues with a skills-based curriculum. The reports recommended a return towards a knowledge-based curriculum, stating the need for a focus on concepts and the knowledge that pupils require as justified in the reports of Oates (2010), Young (2011) and Young and Muller (2013).

Hirsch (1988) explained that a knowledge-based curriculum is one in which pupils should learn certain concepts, facts or theories to gain knowledge related to their situation which he describes as cultural literacy. Hirsch (2016) adds to his earlier work explaining that pupils are taught through a teacher-led approach designed to educate the pupils so they can list or explain this knowledge demonstrating they have been educated enough to successfully follow their chosen path in the world. This knowledge-based approach (Hirsch, 2016) links to a current popular practice of direct or explicit instruction Kirschner *et al.* (2006) based on the learning theory of Becker and Engelmann (1977). This sees a move away from a skills-based way of learning

such as PBL to a point where explicit or direct instructions are given through a teacher-led practice. Kirschner *et al.*'s (2006) reasons for using direct instruction are to ensure clear guidance and knowledge is passed onto learners. Ashman (2019) believes direct instruction or active teaching where the teacher delivers the content rather than relying on pupils discovering it through other methods such as by using inquiry-based learning or PBL to be the most effective classrooms practices for learning. Indeed, Pedaste *et al.* (2015) agree highlighting that varied amounts of teacher led learning used through inquiry-based learning or PBL can be detrimental and mean learning does not take place. Through direct instruction teachers will not only give instruction but make use of a range of pedagogy including demonstrations and examples that allow the pupils to learn. Kirschner *et al.* (2006) explain that teachers can therefore tailor their approaches and guidance to the correct level, building on their pupils' initial ideas to foster learning and allow the pupils to master the subject knowledge.

This opposes a skills-based curriculum removing the ideas of broadening or extending the curriculum beyond the key knowledge required - a key point within Hirsch's model of this type of curriculum. Hirsch (2016) goes further to recommend that a knowledge-based curriculum should solely focus on the core subjects of English, Mathematics and Science, with little or no time being (as he describes it) wasted on languages and the arts. The recommendations from Wolf (2011), along with Young and Muller's (2013) analysis of a knowledge-based curriculum, add further evidence to support the adoption of this knowledge-based curriculum. These reports helped inform the speeches of Gove (2014) and Gibb (2015) when outlining their desire to move the 2014 curriculum (DfE, 2013) towards a knowledge-based curriculum to develop pupils' knowledge, particularly in the Science, Technology, Engineering and Mathematics (STEM) subjects. Further reasons for the direction were both the Government's beliefs

and other governments' (OECD, 2016) views that knowledge in the STEM subjects could facilitate future careers and economic growth. Reading the transcripts of the speeches and indeed curriculum 2014 (DfE, 2013) does suggest that there is still a case for the development of certain skills, particularly ICT skills through a knowledge-based approach that does slightly contradict Hirsch's (2016) ideology. The reasoning for the development of these ICT skills through the new Computer Science course is made based on economical reasoning and the future direction of the digital economy. This sits well in terms of my research and desire to improve my pupil's knowledge of Physics but also ensure they have digital skills for their futures.

In summary, both curriculums offer pupils a possible pathway to success. Arguments for and against can be traded but in fact seem to come down to the ideological desire of a government rather than any academic evidence. The government of the time simply decides how to shape its own curriculum based on its ethos, ideology, values, and what way it best believes benefits the economy and the country's future. The returning coalition government in 2010 sought to move back towards the Conservative model of the late 1980s and 1990s, echoing the introduction of the TEVI (DfE 1988) that they believed changed the curriculum for the better and would advance the future economy. Reflecting on the literature, I believe my current school is in the privileged position to adopt ideas from both types of curriculum to benefit pupils by allowing knowledge built alongside the development of knowledge. Although this may sound like 'an easy way out', my goal as a teacher is to ensure my pupils have the knowledge to pass their examinations whilst also making sure they do have the skills for their future to access higher education and work.

2.5 Innovating learning with ICT

The national curriculum and government policies demonstrate the changes adopted over nearly 40 years of ICT in education. Bates (1993) suggested the possibilities that ICT could lead to in education:

Technology can provide learning experiences not otherwise available even of a face-to-face teaching situation. (Bates 1993, p.220)

The Stevenson Report (Stevenson, 1997) followed by the changes to government in 1997 and subsequent Curriculum 2000 saw the introduction of ICT that led to this statement starting to be realised. By the time of the conclusion of the educational reviews by Ofsted (2012b) and the DfE (2013) it was clear that pupils' ICT had significantly developed, and resources were providing the experience Bates (1993) alluded to.

Perhaps Bates (1993) would never have considered the learning experiences possible in modern day education with the combination of ICT and the internet, which now even allows for global learning. The OECD's *Measuring Innovation in Education Report* (OECD, 2016) highlighted the practice of innovation in teaching that was allowing teachers to combine technology with or replace more traditional methods to redefine the worlds in which pupils were learning. This move towards innovation was at the heart of the then Education Secretary Michael Gove's address to schools and their leaders (Gove, 2014). He highlighted the potential of technologies aimed at opening new learning practices that would innovate, invigorate and revolutionise the delivery of modern-day curriculums. This seemed to reflect the sentiment of Bates' (1993) vision for the possibility of learning experiences moving away from a face-to-face classroom-based experience.

The review and subsequent 2014 National Curriculum (DfE, 2013) reflected Gove's words with a push towards allowing pupils the opportunity to develop their ICT skills through a wide range of new ICT and mobile technologies that should be incorporated into learning. Despite the move towards a more knowledge-based approach, it was clear that skills were still valued, with transferable digital skills and collaborative skills in turn reflecting the case schools' (section 2.2) ACP and the school's managements vision of the curriculum. As previously set out, the idea of innovation in education (OECD, 2016) explains ICT being used as a mediating factor to help deliver innovation in teaching practices and pedagogy.

It is important to consider the warnings given through the educational reports and policies of Stevenson (1997), Tomlinson (2004) and DfE (2013) explaining that success depends not only on the delivery of the curriculum to pupils but ensuring pupils have the skills to access this curriculum. Indeed, this has been considered through the school's ACP (School X, 2017), for example in the identification of a skills gap in digital skills of Y7 pupils that led to the introduction of the Y7 digital diploma in order to bridge this gap.

There has been a rich literature around the uses of ICT and mobile technologies in education since the early 2000s. The innovations during this period best represent the ICT I have available and the interventions I could put in place during my study. Examples of innovation with ICT in education, sometimes referred to as e-learning, that sit close to the area I am researching come in the form of educational software packages (Veenstra *et al.*, 2009), internet-based learning with mobile devices/technology (Traxler, 2010 and Beatty, 2013) and Virtual Learning Environments (VLE) or social media learning-based platforms Rambe (2012).

2.5.1. Globalisation of learning through use of ICT

As early as 2010 Rizvi and Lingard (2010) identified globalisation as the key driving factor behind new educational policies with the advent of the internet. The globalisation of education through the early 2000s allowed for large-scale studies that cross-examined countries' education systems finding out what works best and who gains the best results. UNESCO (2011) and the OECD (2014 and 2016) conducted a number of these research studies, leading to published global league tables allowing the ranking of countries in terms of their education systems. The OECD's (2016) Programme for International Student Assessment (PISA) is one example of this, allowing members to view data from thousands of students in their own nation but also to compare this with other nations.

This then leads to ranking across subjects and skills between nations, meaning that governments now must contend not only with seeing how students perform against each other nationally but also internationally. Garrett and Forrester (2012) moved the discussion on from just focusing on education to how the standard of education now directly links to a country's economy. The OECD (2016) research builds on this link, explaining the need for pupils to move from school with the digital skills required to take up roles within a digital economy that is only going to expand in the future. This demonstrates how not only has the way in which education changed since the early 2000s but how countries' economies now interlink with this, particularly in the technologies sector.

2.5.2 Educational software, edutainment and gamification

Figure 2.5.1a – Definitions of types of specialised softwares used in education

Type of software	Explanation
Augmented Reality	A virtual environment usually accessed using a mobile or tablet devices camera that allows you to see or view content. (Veenstra <i>et al.</i> , 2009)
Educational software	Any form of computer software used by a teacher with the aim of aiding learning or improving knowledge. (Traxler, 2013)
Edutainment	Where software has been produced to teach pupils with the idea of providing a form of entertainment to keep interest in the learning. (Veenstra <i>et al.</i> , 2009)
Gamification	When an educational piece of software has been turned into a game or video game. Commonly the learning activity then involves completing a task to move to a higher level or score points. The aim of this is to again keep interest in the learning activity. (Shadiev <i>et al.</i> , 2018)
Virtual Reality	Software that is when viewed takes learnings to a virtual world. This can be combined with learning activities to form an educational experience. (Shadiev <i>et al.</i> , 2018)

Veenstra *et al.* (2009) state that the most common use of ICT in a classroom is to run a form of educational software that is widely available across all levels of education called edutainment or gamification. This type of software seeks to provide an interactive learning environment for pupils (Shadiev *et al.*, 2018) through a videogame-like setting, by turning a concept, subject or topic into a series of mini games (Veenstra *et al.*, 2009) designed to improve engagement in learning activities. Traxler (2013) demonstrates how the use of Augmented or Virtual Reality could allow geographical barriers to be broken and immerse pupils in experiences or world away from the classroom in a lesson without needing to leave the classroom. Indeed Chang *et al.* (2014) believe that, as pupils are immersed in virtual worlds, it draws them into an engaging learning experience that then aids recall when answering questions on the experiences.

Pupils' feedback on this type of interaction was positive, especially in being able to access these different worlds, with a number feeling that the experience did aid their learning. In the research of Veenstra *et al.* (2009) and Childs and Peachy (2013) pupils had mixed views on the effectiveness of this practice; there was a different degree of pupil success and engagement. Across the research there were examples of engagement that led to learning outcomes being met; however, many participants found that the "learning environments" were geared more towards entertainment than the learning. This meant pupils felt they missed the point of the learning experience or would have rather been taught in a more traditional manner. Despite the claims of the researchers above, it is still clear this area of innovation has some way to go as none of the studies I reviewed were able to give hard evidence that the experiences had improved or aided learning.

Bourgonjon *et al.*'s (2010) research possibly took the idea of gamification too far when investigating the idea of a curriculum as a video game, based on the notion of the pupils at that time being part of the gamer generation (Beck and Wade 2004). This too had similar outcomes to the two studies above; the pupils involved found the perceived usefulness, ease of use and learning opportunities affected and indeed limited their learning experience. As Bourgonjon *et al.*'s (2010) explained, for this to be useful in the classroom pupils would need training in how to use a video game in order to be able to use the video game to learn. This again echoes the sentiments of the education reviews where a lack of training and support caused opportunities to be missed when using ICT in education. Therefore, implementation of a radical curriculum like this would be detrimental to other skills.

These research studies demonstrate that the balance between education, entertainment or virtual worlds is a fine line and that currently it is not clear whether there are positive or negative impacts on pupils' education. Van de Walle *et al.* (2010) investigation of mathematics taught in this manner suggests that the application of skills within the software is key to overcoming the idea of just entertainment. This allows a move back towards an educational learning experience rather than just gameplay. Incorporating the need to use skills such as analytical, cognitive or problem solving opens the opportunity for pupils not only to learn or enhance subject knowledge (Zin and Zain, 2010) but also to further skills. It seemed from feedback and reflections that pupils did engage with the process and they perceived that they had developed their skills.

Oblinger's (2004) echoing argument hinges on the way pilots have for decades trained to fly planes using immersive simulations. Pilot training relies on a pilot to gain an understanding of the practices required for flight but also to hone the development of their cognitive and fine motor skills required to fly an aeroplane. In this manner, Oblinger (2004) demonstrates the educational value of simulations leading to learning and development of skills concordantly. Zin and Zain's (2010) research backs up the use of edutainment software settings, allowing the enhancement of learning outcomes whilst furthering the development of skills.

Edutainment software has been successfully used with dyslexic pupils over several years as demonstrated through Smythe's (2010) research. Smythe credits this type of software with demonstrating clear improvement in dyslexic pupils' development of spelling, literacy and numeracy skills. Here the standard approach is through basic recall questions making use of the testing effect (Christodoulou, 2014). As outlined by Christodoulou (2014) the effect uses cycles of recall to help develop the long-term

memory allowing for easier access to this information in the future. Indeed DeKanter (2006) believes this type of software is not only about achieving learning outcomes but that it can also be used to develop pupils' adaptability, competition and communication skills that will make them successful in the future. The adaptation of these skills links with Oblinger's (2004) explanation of the claimed advantages of using immersive edutainment software where pupils can experience a virtual world and learn through simulations.

Griffin (2007) claims that the benefits of this type of software allows teachers minimal preparation with maximized learning demonstrating the future possibilities of the software if they can deliver the promised learning outcomes. However, as suggested in the reviews of Carr (2012) and Shadiev *et al.* (2018), a significant barrier is finding the right piece of software. This is due to major software companies' reticence to publish educational software due to regulation and need for high levels of scrutiny to ensure content replicates educational specifications exactly. This issue was initially raised by DeKanter's (2006) and still exists today, that unless you can produce your own bespoke software you may struggle to find a piece that specifically addresses your learning outcomes.

2.5.3 Internet based learning with mobile devices

In 2015, the case school decided to open a lower school that would cater for Y7 and Y8; with this decision a review of the curriculum ensued. The school decided - based on competitors, senior leadership views and research - to introduce tablet devices for all pupils in Y7 when the lower school opened. These offered a chance for innovation and since 2016 the years in the school up to Y10 now have a personal device. The development of mobile technology has accelerated since the advent of tablet devices

in 2010 (Murphy, 2011) with nearly 400 million sold to date in 2018. Since the launch of these devices, globally companies have continued to invest millions of pounds in research and design of this technology to ensure their devices are the best smart phones or tablets available. Each device has a common theme: it allows connectivity to the internet from almost anywhere in the world through an internet connection.

Bignell and Parson (2010, cited by Childs *et al.* 2012) refer to good examples of pedagogical practice enhancement using new mobiles and ICT, highlighted by Ofsted's (2012) guide on good practice, praising Hull College and South Devon College for the ways they developed teachers' and students' skills across the curriculum using a range of different media to support learning in and out of the classroom. Beatty (2013) highlighted opportunities that exist around mobile devices, showing the possibility they have in education to allow learning to take place almost anywhere.

Two surveys demonstrate how popular mobile devices are amongst children and young adults in the UK. The average adult (16 years or older) spends 3 hours 36 minutes a day on their smartphone or tablet (Ofcom 2014); 94% of mobile communication between 12-15-year olds is via instant messaging and social networking. Further research by the We Are Apps study (2013) shows 73.6% of 15 to 24-year olds owned a smartphone, thus being able to access content via the internet; however only 16% of those in secondary education used it for schoolwork. The studies above suggest that if pupils do have the devices then through an innovative curriculum it should be possible to increase engagement. This is agreed with by Keengwe and Bhargava (2014) who suggest pupils will adopt this approach and use devices based on the feedback and perceptions of participants in their research.

These claims offer justification for the reasoning behind the school's ACP (School X, 2017) to give pupils tablet devices and encourage innovation in order to facilitate learning. Murphy (2011) identifies various advantages of using mobile devices that again offer further support by stating that they: increase connectivity, allow blended learning, give instant access to information and learning, increase productivity and collaboration between students. Murphy (2011) and Keengwe and Bhargava's (2014) claims set out possible justification for use of innovation and ICT but do not clearly give pupils' perceptions and reactions to its use or whether they feel it aids learning. The claims give reason to carry out my research to investigate how the pupils perceive the changes in teaching and whether they believe that these changes and innovations are benefitting their learning.

Traxler (2013) has examined the ways mobile devices are used in tertiary education as well as the positive ways mobile learning can enable and influence the learning of languages. It is the sheer volume of information that can be accessed, shared and collaborated on, which makes mobile devices and the internet such a powerful learning resource. However, despite offering an unrivalled method of learning, questions remain as to how these devices are monitored and controlled that could affect whether the learning takes place. Again, this demonstrates a possible use but there is a lack of literature in the context of the secondary school I work in and my research may be able to produce new knowledge within this context.

Despite this, the OECD (2016) study outlines the possibilities ICT and mobile technologies offer. The real benefit of mobile devices highlighted across research (Bidin and Ziden, 2012) is connectivity and the ability to connect to the internet, allowing pupils or learners to - in theory - learn from anywhere. As Cohen (2015) explains, this functionality allows the devices to provide immediate information on just

about anything. Mobile learning does not require a learner to be in a library or a lesson to retrieve information on a topic; it is indeed this functionality which makes it such a powerful resource. Bidin and Ziden (2012) consider how learning may be formal in a classroom or, by using a device and moving the learning away from the classroom, may become informal, giving the learner a choice to learn or what to learn. This application of mobile learning referred to as m-learning (Traxler 2007) offers a new flexibility for teachers and learners alike. With the rise in Applications (Apps) - small programmes which can be programmed with relative ease and accessed via the internet - teachers can indeed begin to make their own learning resources available.

The Ofsted 2012 report identifies missed opportunities to implement the use of ICT in lessons, raising the question as to how it is best to use new technologies and whether pupils will engage with technologies designed to offer help and support. As shown through previously mentioned studies, many pupils do already possess devices. Cho and Reinders (2010) research backs up my personal feeling that students are interested and will engage with IT and technology. They found students wanted to engage and make use of mobile devices; this is something I was keen to examine as I already use mobile devices in my teaching. Research into the use of technologies in education is increasing, as literature demonstrates that both governments (OECD, 2016) and companies want to benefit economically from the potential of higher levels of digitally skilled people in their workforce. One study focused on English Language education showing the possible benefits of using technologies as higher student participation, motivation and transferable skills (Sweeney 2013), again linking back to the use of edutainment software.

Despite these positive advances and the wealth of resources available via mobile devices, it is clear there are still issues with implementing learning with them. Early

studies including the example of Kinash *et al.* (2011, cited by Vannucci *et al.*, 2017) revealed the anxiety pupils still have towards ICT. This study demonstrated that pupils were worried and not convinced that work would be kept safe, saved or even submitted correctly when using mobile devices.

Technical issues plague the use of ICT within an educational setting; the two main issues are insufficient training and the lack of technical support. As a teacher, I have seen first-hand how frustrating these issues can be, not just for myself but also for the pupils. Childs *et al.* (2012) and Ofsted (2011) state this as a reason for pupils not engaging or dismissing ICT as a learning tool, believing it is not reliable. With mobile devices, this is amplified especially when depending upon connectivity or internet connections that without all necessary information then become unsaleable. Borko *et al.* (2009) found technical issues are in part due to a lack of training and support; both require funding, and this is not always available within institutions or for individuals when they may be working at a distance from the institution. In part, functionality and technical problems experienced by Boko *et al.* (2009) also came about due to lack of testing, as companies rushed to get the latest ICT out for commercial reasons before the next one or another company beat them to it. In order to help combat some technical issues Sweeney (2013) offers the idea of educators spending more time immersed in the technologies and using them in their day-to-day lives as this will help successfully transfer the skills into their teaching. Again, this reflects direction from educational reviews regarding ensuring teachers and pupils alike possess the skills necessary to use the ICT.

It is not only technical implications that can affect learning by mobile devices; the results of several studies including Park (2011) cited by Beatty (2013) and Murphy (2011) raise questions regarding learning theories and pedagogy relating to these

devices. Park (2011) raises the lack of a theoretical framework around the use of technologies in education. This point is reflected by Chun and Tsui (2010) whose research found that despite an abundance of mobile devices and interest in using them, there was little or no framework to guide developers, educators or teachers. This again matches issues regarding a lack of development with software from large software companies due to hesitancy in understanding specifications. This is an area which requires more thorough examination, as without these frameworks in place teachers cannot accurately state whether technologies are effective in teaching and meeting learning outcomes or whether the use of technologies is a waste of time. Both Beatty (2013) and Traxler (2013) agree that further investigation is required. Traxler (2013) goes further, suggesting the mobile learning environment requires more research that must investigate the relevance of mobile learning to understand economic, human and social costs. Part of this can be seen in research since that within the PISA study from the OECD (2016) when linking economic factors to education that focuses on the disparity across the world's schooling as to the amount ICT is used and manner in which it appears in teaching and learning.

This framework sits outside the scope of this research, as it is not clear about an exact way of measuring the impact of technology. When forming the research study this is partly to explain why I sought to examine the perceptions and reactions of pupils rather than measure the impact of an intervention.

2.5.4 Virtual Learning Environments and social media learning platforms

Park (2011) identified four areas that mobile technology could help to develop in learning. The final one is communication and collaboration, focused on how a device makes use of its connectivity to access the internet allowing the learner to work with others. Chen *et al.* (2008) highlight the way colleges and universities have changed the way educational material is available over the past 15 years. In their US study the rise of Blackboard and other Learning Management Systems, otherwise known as VLE, have led to students expecting material to be available online; this is true too in the UK as set out by Traxler (2009). A VLE runs as an online virtual classroom where pupils can log in to access a range of assignments, chatrooms, homework, media and learning materials specific to their course or online/e-learning course (Swann, 2013). VLE may allow communication via messaging or video messaging to enable discussion of work and tasks, as well as allow for online submission of work. This means that students do not have to physically attend an institution, or they can access the material alongside lectures and tutorials. Most schools and universities have VLE that run alongside attended courses.

In 2012, Harvard and Massachusetts Institute of Technology (Ho *et al.*, 2014) universities opened a new online set of courses named MOOCs. A MOOCs known as Massive Open Online Courses (MOOCs) are online courses in a vast range of different topics that are free to access and aimed to reach an unlimited number of people around the world. The course works through step-by-step to cover material in the course online, and at the end of the course the learner takes a test that provides certification in passing and completing the course. With no charge, it aims to create an online learning community of lifelong learners. MOOCs are now available from numerous institutions around the world and in just about every topic imaginable.

All that is required is that a user has a will to learn or interest in the course along with basic ICT skills and access to the internet from a mobile device or computer to allow them to enrol on this type of course. This online course that can be accessed by anyone from anywhere fulfils Chen *et al.*'s (2008) criteria for the possible learning environments set out in their work. This type of learning environment also allows for the interactions that Meurant (2010) identified between disparate groups, regardless of their affiliation or geographical dispersion. This once again demonstrates the possibility of learning through mobile technologies or social media technologies that have the capacity to allow interaction between learners.

2.5.5 Examples of using and learning with VLE

Issroff and Scanlon (2002), Rambe (2012) and Swann (2013) carried out studies into the use of online courses making use of VLE to support the learning of students that reflect the ideas of how I want to use my CLP to hopefully aid their learning.

Issroff and Scanlon (2002) examined the use of VLE in two different ways: one in a completely VLE-based course and the second where a VLE supported a traditional (face-to-face) course. Their research used qualitative data analysis, gaining the perceptions and reactions of students on both courses through interviews. Their data presented positive aspects that included: positive feedback from learners with examples of how the VLE aided learning, engagement with the VLE resources and ability to collaborate with others and learn through the VLE. The pupils also identified issues around the use of the VLE, roles of the participants in the study when using the VLE and how it reduced engagement in face-to-face learning.

With the VLE-only course, participants became embroiled in arguments over etiquette in forums and comments turned to voicing their own views and venting their anger at others not using it correctly. This suggested that a framework was required, and further guidance should have been given on using the VLE to allow students to just focus on learning rather than how they should be learning. The second course using a VLE to support traditional lectures created two problems: first, remote access to the VLE was an issue due to the low-speed internet connection at the time, which meant participants could not easily access all the materials, while the second issue was caused as students did not necessarily use the VLE to support their learning. Some students just printed off all the notes and did not make use of lectures; some did not engage with the VLE resources at all, and others only made use of it in the run up to the exams. Issroff and Scanlon (2002) found the biggest impact was on the lack of engagement in the face-to-face learning, due to participants' over reliance on the notes when they printed them all. Issroff and Scanlon (2002) demonstrated two points: first, which they achieved a set of rich qualitative data that shaped my decision to carry out interviews along with questionnaires in this research. Secondly, as CL is a primary focus through my CLP, I must ensure I use guidance and a framework to remove the issues they experienced that detracted from possible learning.

Rambe (2012) investigated using Facebook, a social networking site, as an academic networking tool and personalised VLE. The research investigated the potential of the site for scaffolding learning, where resources and social interactions between university students were designed to facilitate CL and aid learning. Rambe (2012) suggested that two clear paths for learners to obtain knowledge existed within the study. The first demonstrated participants interacting through the social media platform with fellow students and lecturers to discuss topics and work collaboratively together

that helped to generate an understanding around the topics and fulfilled the designed learning pathway. However, the second approach by some participants was to just seek the answers from reviewing peers' questions and the comments that had been left in the chatrooms or simply message fellow students or lecturers asking for the answers directly.

This demonstrated a limitation in the mediating tool that Facebook was designed to be as not all the conversations could be monitored. This meant Rambe did not have control over certain chat groups that sprang up sharing the answers. As with Issroff and Scanlon's (2002) approach Rambe's (2012) demonstrated a possible naivety as to how pupils could use the collaborative functionality, highlighting the importance for this to be controllable and to have clear guidance in place.

Swann's (2013) research investigated learners' perceptions of engagement across 393 different eLearning courses set at a variety of levels, developed by a commercial provider to enhance learning outside the classroom. The study investigated how the combinations of different audio and visual media influenced the engagement of students and could support their learning. The groups were split into two related to the variety of media that their side of the course would support.

Group 1. Full text + Image < Audio + Part text + Image

Group 2. Audio + Full text + Image < Audio + Part text + Image.

Choosing the different amounts of each type of media allowed Swann to track the path participants took through the course. Generally, students opted to use less audio, meaning they get through the course quicker. Swann (2013) believed this would have an adverse effect, meaning students would be less engaged with the course if they were going through it quicker and this would negatively affect their learning. Indeed, I

have witnessed this when using e-learning software in lessons, seeing that pupils often opt to skip sections to move onto the questions or next part in a rush to complete the work. The findings centred on the difference in students who were motivated externally or internally. Internal motivations, come from ourselves and causes us to want to achieve or do a job as we feel a sense of pride when completing it whereas external come from outside, such as receiving a prize for completing a task. Swann found those with external motivations were boosted by this, displaying stronger engagement with the courses, whereas those who harvested internal motivation displayed little modest engagement with the content pages.

Across the three examples, the researchers do highlight positive aspects, where it was clear from the rich qualitative data from participants able to demonstrate or give examples of how they made progress or gained knowledge or developed skills. Indeed, this follows Smeets (2005) fostering learning through VLE noting the availability of information and possibility to develop skills. However, the main issues caused came from the interactions of learners with the VLE; a lack of perceived understanding for the framework, rules or resources meant learning was not achieved in the manner intended.

Despite Issroff and Scanlon's (2002) attempt to include a set of rules for the community to abide by, outlining a framework for the online community, it was the nature or misunderstanding from naive participants using a VLE for the first time that seems to have been responsible for most issues. As the issues raised of other participants' use of the chat rooms or errors by others were not expected, it demonstrates the need for a well-planned and carefully explained framework to ensure it does not happen. This is similar to the issue Rambe (2012) found when using unmonitored collaboration and how learners would take short cuts in learning to arrive at the answers, reflecting the

issues Swann (2013) found with some lack of engagement by trying to short cut the course. All three demonstrate the need for a clear set of rules and framework for learning. As stated within the research into ICT in education (section 2.2), ensuring that all the learners have the necessary skills to access the learning is a key to outcomes being met, requiring pupils to have a high degree of understanding of the culture, practices and situation of the environment for learning to taking place. A further positive of the three studies was that participants were keen to engage within the community. I agree it was not always in the way the researcher intended, but there was significant collaboration, suggesting CL can be fostered using ICT.

I felt that these three examples that I reviewed above provide a balanced look at the positive and negative perceptions around the use of VLE and could be related to how I would investigate using a CLP to aid learning. Although I did find several other studies carried out within tertiary educational settings between 2000 and 2016, at the time of writing there was a frustrating lack of literature within a secondary school setting. A justification of my study is to offer a view on this area, in particular to investigate the pupils' perceptions and reactions to the use of a CLP.

2.6 Collaborative Learning and Theories of Collaborative learning

2.6.1 Why we use collaborative learning

Section 2.5 demonstrated and reviewed how innovations in ICT and technology have been used in teaching and learning since the late 1980s to the present day. As explained through section 2.3, the changes in the secondary curriculum combined with new technologies have enabled teaching and learning to develop, and a particular area of significance for this research is how pupils and teachers have been able to use ICT to collaborate and work together. Indeed Gokhale (1995) and Chen and Chuang (2003) are two advocates of the benefits of learning and development of the skills that CL can bring in an educational setting.

By fostering these ideas and introducing the use of ICT as a supportive framework Smeets (2005) Chen *et al.* (2008) have successfully demonstrated the potential to facilitate learning in several different situations as well as develop skills. They explained that making use of CL enabled pupils to work together, learning from one another by sharing ideas and building their understanding of different topics. It is clear from a number of research projects (Issroff and Scanlon 2002, Rambe 2012 and Chanug, 2014) that by adopting a CL approach, integrated with ICT, rich qualitative data can be produced, giving the participants' perceptions that would help to further investigate the research I undertook. The approaches above suggest there is scope in using the methods outlined in section 2.5 to aid the delivery of teaching and learning. The ideas of the development of pupils' skills also fit the model of a skills-based curriculum discussed in section 2.4 and align with the school's aims and ethos explained in Chapter 1.

2.6.2 Defining collaborative learning

CL describes an approach to learning based on situations where groups of people can come together to share abilities and contributions which are not just confined to a classroom, but which can enable learning anywhere.

Panitz (1999, p.1) defines CL as:

The underlying premise of collaborative learning is based upon consensus building through cooperation by group members, in contrast to competition in which individuals best other group members.

Gokhale (1995, p.1) has a similar view that defines CL as:

An instruction method in which students work in groups toward a common academic goal.

He notes that this differs from individual learning, which is achieved through pupils working at their own rate towards that goal but also at their own level. This points to his believing that by bringing a group of pupils together, levels can be changed or removed by utilising all members of the group's strengths.

In a literature review on CL, Laal and Ghodsi (2012) create a definition explaining that the approach is based on:

Teaching and learning that involve groups of learners working together to solve a problem, complete a task, or create a product.

Laal and Ghodsi (2012) continue to return to the importance of group work throughout their review and the formation of groups based around what they can bring to a community in order to learn together. All three works highlighted the need for individual goals or competition to be removed to allow the greater goal of the group achieving a set task. Laal and Ghodsi (2012) cite Gokhale to demonstrate the importance of this point to ensure that one learner can help others to be successful.

Across the explanations of those above and Johnson and Johnson (1989), ranges of benefits from this approach to learning are given. Perhaps for Panitz (1999) four

distinct categories best demonstrate the holistic nature of CL across learning. Pupils can achieve across the four sub-topics of Social, Psychological, Academic and Assessment when using this approach to achieve goals through collaboration. The works further detail how CL should be explained to participants to ensure they know the process and means by which it is achieved. First, the clear specification of the academic task, followed by CL structure explained to the students. Indeed, this mirrors the advice Rambe (2012) gave when stating a need for a clear structure required when introducing learners to new methods. Over the course of the review a recurring theme is the bringing together of a group and the need for each member of the group to be a part of the learning. I found this echoed with the thoughts of Gokhale (1995), continually highlighting the need for each member to listen carefully whilst being mindful that this could cause them to reconsider or change their perspectives or views.

2.6.3 Reason for a collaborative approach

Introducing CL reflects a cultural and ideological shift from the most recent knowledge-based curriculum of 2014 (DfE, 2013), as set out by the then Education Minister, Gove, with his view to build pupils' knowledge through engagement in teacher-led approaches to teaching and learning. Vygotsky's (1978) socialist background from the USSR in the 1930s had a different standpoint to the current ideology that exists behind the modern curriculum. However, Vygotsky's ideas were adopted into education throughout the 1970s and 1980s and again, forming a core part of the Labour Party's Curriculum 2000 with a focus around skills-based learning, as explained in sections 2.3.5 and 2.4.

This was evidenced by combining this approach with the ideas of Bloom's (1956) taxonomy for developing higher-level thinking skills as seen in the mandatory four skills of analysing, interpreting, evaluating and presenting (DfES, 2004) in the curriculum. Although there is a clear difference in these ideological standpoints and a move towards a knowledge-based curriculum, the school's management (ACP School X, 2017) and indeed the OECD (2016) see the advantages in developing transferable skills such as CL by pupils working with their peers – skills that they will need in their future education and careers.

Indeed, CL sits within a broader domain of learning theory based around the principles of constructivism (Vygotsky, 1978) that include group-work, PBL and situated learning. These notions are all related through the principles that Laal and Ghodsi (2012) suggest by bringing learners together to work collaboratively to build knowledge or solve problems. As discussed in section 2.4, Cooper and Murphy (2016) highlight the ways that these approaches can be used by teachers to improve pupils' knowledge and skills.

2.6.4 Learning theories and collaborative learning

The learning theories adapted from constructivism and built upon the works of Vygotsky and Bruner underpin CL. These theories explain how cognitive development is highly dependent on social interactions with others (Vygotsky, 1978). When undertaking a task Vygotsky (1978) saw the learner (child or pupil) as in the Zone of Proximal Development (ZPD) where cognition is developed through social interactions. The social interactions are required to complete tasks that would be too difficult for the individual to master. Vygotsky's (1978) beliefs therefore suggest that knowledge is co-constructed by learners working together or with the assistance of a

teacher to learn, construct knowledge or master a task. Scaffolding can be used which allows a teacher to support the learner through this process by providing the right amount of assistance at critical points during the task. Vygotsky's (1978) principles allowing for a constructivist approach can therefore lead to CL being used by learners to co-construct knowledge or solve problems.

This links in with the ideas of Brucato (2005) that learning depends upon the context, subjects, behaviour and environment that it is set in. CL reflects the activity learning theory demonstrated in the research by Issroff and Scanlon (2002); this requires conceptualising learning involving a subject, object and mediating artefact, in this case the VLE. As Yamagata-Lynch (2010) explains, learning is set out as object-orientated activities, which involve individuals, and the environment they are set in. In constructivism, interactions need to be provided by the expert or teacher as Vygotsky (1978) frames them, in order to assist the learner to complete the task. Prawat & Floden (1994) agree with this notion that the creation of knowledge is most effective when supported by a collaborative discourse. The beliefs of Krischner *et al.* (2004) are that CL shifts from a teacher-led perspective to one where the learner becomes more active to construct learning through social interactions with other learners. This relates to the ideas of Prawat & Floden (1994) in identifying how learners will seek out and collaborate with their peers to identify sources of information leading to the completion of the set tasks.

Combining the ideas of the ZPD (Vygotsky, 1978) with the use of mediating artefacts (Engestrom, 1987) a teacher can choose a supportive framework guide and assist the learners' discourse. This is seen in the research of Issroff and Scanlon (2002), Rambe (2012) and Swann (2013) where each choose the VLE that would support and determine the interactions that could take place between the learners to foster new

knowledge. Through their interactions a common goal is then determined, and the learners assist one another. This reflects on Gokhale's (1995) theory of a learner having a certain level individually, but when combining learners together the group works to a higher level. Indeed Mercer (1996) proposes this only exists if metacognition is encouraged through discussion via collaboration calling on a mutually supportive learning environment not solely dependent upon a single expert.

Gokhale (1995) and Chen and Chuang (2003) argue that not only the learning of the group improves but also the learning skills they possess. They credit the use of CL with improving learners' critical thinking, judgement, negotiating and problem-solving skills. Vygotsky (1978) along with Panitz (1999) Laal and Ghodsi (2012) also think that CL can trigger higher-level thinking skills. Chen and Chuang (2003) suggests this can enable a learner to access the higher levels of Bloom's Taxonomy. The taxonomy as outlined by Chen and Chuang (2003) is a hierarchical order demonstrating the level of learners' cognitive skills. In using CL, the collaboration allows for inter-personal discussions that can expand cognitive skills (Vygotsky, 1978). This is demonstrated by a learner being able to display a move from the most basic level of the taxonomy, by remembering the knowledge, to the highest levels of evaluating by justifying answers and creating by forming new answers based upon their understanding.

In a move towards pupil led, CL Rutherford *et al.* (2016) highlight the need for a framework to be in place to help guide and support learners. Indeed, they surmise that without this scaffolding (Rutherford *et al.*, 2016) the pupils may struggle to succeed. Scaffolding as introduced by Wood *et al.* (1976) offers educators a means to build a framework for novice learners to use to support them through the ZPD. This allows pupils to work together within this framework in order to solve tasks without the direct involvement of the educator. The work of Issroff and Scanlon (2002), Rambe (2012)

and Swann (2013) demonstrates varying levels of support offered using ICT as the scaffolding. This draws on Wood *et al.*'s (1976) design where the educator judges the ability and level of the individuals in the group to provide material that through their interpretation and discussion can lead to them completing the set task.

CL can increase:

Productivity, more caring, supportive, and committed relationships; and greater psychological health, social competence, and self-esteem. (Laal and Ghodsi, 2012, p.4)

However, across the literature warnings emerge as to issues that can come from the use of CL that it is important to consider in this research project. Across research, the issue of working with others seems to cause the most worry between learners. Rutherford *et al.* (2016) found that some pupils have a belief, whether based on empirical evidence or not, that they work best on their own. No precise reasoning was given but mitigating factors relate to their learning background or cultural experience. Across several studies including Mercer (1996), Dillenbourg (1999) and Rutherford *et al.* (2016) the dynamic of the group is mentioned, ranging from social issues between individuals within a group to the anxiety of having to work with others. Lee *et al.*, (2014) voiced one reason for this being the concern of group work leading to distractions and a loss in learning efficiency. Indeed, this is reflected in another argument (Rutherford *et al.*, 2016) with students stating a belief that not all do their fair share of work, describing this by detailing how some participants felt they wasted time explaining the material to other group members. This is particularly a worry when the CL moves from the classroom to outside. This was evident in the research by Rambe (2012), where several learners just wanted to get the answers without contributing. The issues highlight the need for a framework that will encompass the CL task, which is clearly set out and the process of CL explained to the pupils, as Laal and Ghodshi (2012)

suggest. I intended to follow these suggestions to test whether learners could develop skills and the higher order thinking skills from Bloom's taxonomy (1956) that Chanug's (2014) research describes.

2.6.5 Defining and linking collaborative learning to ICT in forming a CLP

Rutherford (2016) outlines the potential benefits technology can bring to CL by incorporating a range of ICT with CL. The examples used of mobile technologies, social media, VLE and interactive websites demonstrate the potential ICT offers and the ways it can move learning out of the classroom, across cultures, geographic boundaries and language barriers. Smeets (2005) elaborates on this, outlining the potential function as a facilitator to learning and higher order thinking that ICT can offer in the ways mentioned above. Chen *et al.* (2008) found the use of ICT increased engagement and motivated learners when a web-based learning environment is used. These examples demonstrate the possibilities and functionality of incorporating ICT as the mediating factor into a CL approach. The research of Issroff and Scanlon (2002), Rambe (2012) and Swann (2013) studies, along with the research and literature of those mentioned above, describe cases where ICT has successfully been used to help support and guide learners in a collaborative manner.

Through the research the CLP had to be defined. The definition used incorporates the research and literature above to set the framework that was used. In the context of this research, a CLP is defined as a teacher-designed form of online learning environment equipped with a range of different learning activities that will aid pupils' learning through dynamic resources that provide an environment in which scaffolded CL can take place between pupils. The resources will offer material that builds on the content covered in class through dynamic resources, as Swann (2013) suggests, but

also provide an environment in which scaffolded CL can take place. This builds on the impact of the studies above where groups of pupils are brought together to allow for interactions in this case facilitated by interactions via ICT with other pupils and teachers.

2.6.6 ICT facilitating CL through sharing knowledge or enabling copying

Reflecting on the research of Smeets (2005), Rambe (2012), Swann (2013) and Rutherford (2016), they discuss the ways that ICT could potentially help to facilitate CL. Their work suggests that the ICT or social media becomes the mediating artefact that Vygotsky (1978) explains allows for the creation of knowledge. In Rambe's (2004) research it appeared there were issues when using a social media site to allow for collaboration between the participants, revealing that some just exchanged answers or posted how to solve the problems.

This highlights a problem where it appears that pupils could simply make use of ICT or social media to share and copy work without the knowledge of their teacher. The literature of Holub (2008) and Goldstein (2014) goes on to explain and demonstrate how ICT can be used by pupils to share work and in effect copy. Conlin (2007, cited by Holub, 2008), questions whether this method using ICT to share work is cheating or postmodern learning. The argument centres on changes made to examinations in a university where students are seen as 'inventive' by using open sharing websites or collaborating with others to produce their own work. Indeed, whether this means CL is copying or simply that ICT becomes a medium through which learning can happen is debatable and outside the scope of this research. Although, as Vygotsky (1978) explained through the ZPD how children could learn, so perhaps in the internet age

the internet can take the place of the teacher or adult to provide the interactions the child/pupil needs in order to learn.

What is clear is that if the CLP is going to facilitate CL, in the way that Gokhale (1995), Chuang (2004) and Laal and Ghodsi (2012) defined CL, then there needs to be a structure in place that will ensure this approach takes place. Holub (2008) outlined a framework that used a structure that guided the pupils to share ideas and work together when solving problems to mitigate copying and stop a pupil just sharing their answer. I used this idea coupled with regular monitoring of the CLP to ensure pupils did work together to build knowledge or solve problems collaboratively rather than one pupil just giving all the others the answer to the question. This is a key reason why I was not able to simply use the school's current VLE as it did not allow this facility, so I needed to design my own using Microsoft's OneNote as the base platform.

2.7 Choice and design of the CLP

The school did have a VLE, on which each department had a site where they hosted sets of different multimedia resources that pupils could access with the following aims: to aid their learning for examination preparation; refer to additional extension material and obtain further subject resources. I chose to develop my own CLP rather than simply using the school's VLE in the study due to the limitation that the school's VLE could not host the collaborative area that I required to allow pupils to work together in a collaborative manner. I also needed a specific site for each individual class that would host the material specific to them and this was also not possible on the school VLE.

The CLP was a teacher-designed learning environment based on the Microsoft OneNote Classbook platform, meaning I did not have to programme or code my own platform from scratch. Through the OneNote Classbook platform I was able to host two independent CLP that I could monitor and update easily. The Sitemap in Appendix A demonstrates the setup of each of the CLP that was used to display the different sections the pupils could access. Image 1 in Appendix A displays the Y7 CLP welcome page that pupils could then access each lesson from using the menu tab on the left-hand side; this also enabled access by the two-quick links to the collaborative learning area and the help section.

Pupils could access from the main welcome page the necessary lesson resources and the collaborative area which linked to the lessons. The collaborative area allowed for pupils to work together on different tasks and figures 1, 2, and 3 demonstrate how pupils could exchange ideas and thoughts around problems to collaboratively answer questions. As detailed in section 2.4.5, Issroff and Scanlon (2002) and Rambe (2012) highlighted issues with misusing chatrooms when working collaboratively and the design that I used allowed for these to be monitored. I found that monitoring allowed me to offer guidance on mistakes and provide a start point for discussions on some point in lessons, as well as allowing for incorrect work to be removed.

Figures 4 to 6 in Appendix A display screen shots to demonstrate the range of different learning activities designed to aid pupils' learning that included dynamic resources (e.g. animations, videos and interactive models) that provide an environment in which scaffolded CL could take place between pupils aiding and supplementing learning from the classroom. These resources were designed to be used alongside my lessons and traditional approaches to teaching to further aid pupils' learning. I chose these resources based on the literature around CL, ICT and innovation detailed through this

chapter, along with my previous experiences and knowledge of learning pedagogy and resources in the KS3 and 5 curriculums.

2.8 Blended learning

Blended learning is explained by Bogan and Ogles (2016) as an innovative concept bringing together traditional face-to-face in classroom teaching with ICT-assisted learning. Lalima and Dangwal (2017) go on to explain that this approach to learning has scope to pair the use of the methods above with CL, and as Procter (2003) states, if well designed this approach can enhance Vygotsky's (1978) social construction, facilitating CL. The uses of ICT and CL outlined above meet the OECD's (2016) criteria for innovation in learning, along with meeting the school's ACP and desire for teachers to innovate through ICT-based curriculums.

Bogan and Ogles' (2016) discussions suggest that the advantages in this approach are the flexibility of where learning can happen, along with combining ICT with new online learning tools or activities, allowing pupils to collaborate online through social media. Lalima and Dangwal (2017) list further benefits as developing pupils' learning skills, including their communications skills and knowledge through CL. Stein and Graham (2014) pick up on the idea of flexibility, with the perceived benefit of offering learners the chance to work at their own pace, whether some need to revisit material or others can move onto new topics without being held back. Blended learning also allows engagement outside of the classroom, replicating the research of Issroff and Scanlon (2002) and Rambe (2012), by removing these limitations that link to Cohen's (2015) description of mobile learning, which can happen from almost anywhere in the world.

However, Stein and Graham (2014) do pick up on the drawbacks of blended learning, citing the time and development required for teachers to implement this within the curriculum, to allow for engagement and learning to take place. Proctor (2003), Bogan and Ogles (2016) and Lalima and Dangwal (2017) all comment on the time required to train pupils and teachers, along with the investment that may be required to obtain blended learning. However, despite this, overwhelming support through the literature is given to this approach. Examples of the learning opportunities it could offer, along with the development of digital skills and CL, are given by all above. Bogan and Ogles (2016) believe that blended learning could offer much to the educational system and could benefit learners if it is implemented in an organised and well-planned manner.

Thought this chapter the idea of implementing change has been discussed. The key factor behind any implementation is the teachers who will have to adopt these changes and introduce innovations such as blended learning. Richardson (1998) and Dylan (2016) raise the issues with change and highlight the hesitancy and resistance towards change amongst teachers, particularly those who have taught in a certain manner for a long period of time. Although Richardson (1998) does state that the perceptions towards change are not as common as they are reported in teaching, he does explain that teachers do not like change for change's sake. Indeed, Dylan (2016) picks up on the point of more change taking place in recent times and the negative impact this can have on teachers' morale. It is not just the teachers having to put up with a change but also the pupils who both authors acknowledged, conceding that they too may be resistant towards any changes. Both Richardson (1998) and Dylan (2016) explain through evidence-based demonstrations and discussions that if teachers can be shown the benefits a change will have on their practice they are more likely to embrace it and trial it.

2.9 Summary of Chapter Two

This chapter has reviewed the literature related to the background of the study, setting out to provide a review of traditional and modern or innovative approaches to teaching and learning; local, national and global influences on education policy; and how ICT has been transformative in education since 1990. Based on this I was able to establish two important definitions for this research. The first, based on Plevin's (2017) explanation, was the definition of traditional teaching as methods led through face-to-face interactions by teachers that incorporate demonstrations, explanations and presentations in the classroom. The second definition was for innovation in teaching or innovative teaching, defined as new methods that are intended to improve teaching provisions by using ICT, mobile devices, collaboration through technologies and social media. In forming the above definitions, I have been able to explore the background of ICT and innovation in education, including the national and international influences that have led to the building of an understanding of why innovation in teaching around the use of ICT being encouraged as an innovative policy in the case school, in order to answer research question two.

Through the literature I have been able to explain how CL and ICT could be combined to produce an innovative approach to teaching that fulfils the definition of innovation above called a CLP. The learning theories of CL have been discussed along with how it can be used in the classroom to benefit learning by the construction of knowledge between pupils and this would be used as a scaffolding structure in the CLP. A CLP has been defined as a VLE equipped with a range of different learning activities that will aid pupils' learning through dynamic resources that provide an environment in which scaffolded CL can take place between pupils. In setting out the definition I have also been able to explain how it can be used and its desired learning intentions,

therefore outlining the notion of a CLP in an English school answering research question one.

The literature has been contradictory with one study presenting negatives and another one arguing the positives of policy or uses of ICT in education. It is clear from the literature and research that there are barriers and benefits to the approaches using ICT in education. However, the review establishes that by using clear guidance, integrating detailed frameworks, ensuring there is sufficient technical support, appropriate training time and financial investment, then the research suggests innovations can have a positive impact on teaching and learning. A preferred practice suggested by Moore (2005) and Bogan and Ogles (2016) would be to incorporate new innovative teaching practices with more traditional practices to create blended learning.

Having explained the background of the research and investigated the literature around this, Chapter 3 goes on to outline the case study methodology and reasons why this was selected leading into the research design and methods chapters.

Chapter Three: Methodology and Methods

3.1 Chapter outline

In this chapter I explore the methodological position taken for the research based on my own position as a researcher and teacher. To understand this position, I began by considering my own background as a scientist and how I felt about using qualitative and quantitative data as evidence to support my findings. This led me to question and investigate my views within the areas of Axiology, Epistemology and Ontology to find a point to view the study from. Having established this through the discussions in section 3.2, the focus turns to the methodological approach that will enable the study fitting within my research background, through section 3.3 I critic action research, evaluation and case study arriving at a decision to use case study for the research methodology that fits the investigation to explore the benefits of and barriers of innovation in the physics curriculum using the CLP. Chapter 4 follows this chapter where I then set out the research design and methods that will be used in the data collection process.

3.2 Axiology, Epistemology and Ontology

3.2.1 My background as a researcher and teacher

When I began this research project, it made me question my views on why I wanted to change my own approach within teaching and learning to adopt more innovative practices. I personally felt that by adapting this approach it could improve engagement as well as develop pupils' skills as I had seen from the school management's decision to bring in individual tablets for Y7 to Y10. However, I wondered whether there was anything wrong with a traditional approach to teaching and learning, and whether I was wasting time by investigating how pupils would view different approaches to their

teaching and learning. In fact, could it be detrimental to change from these more traditional approaches to more innovative ones? Recent literature including Gove (2014), Gibb (2015) and Williams (2016) established that change is always needed to develop pupils' engagement, knowledge and skills. This builds upon the ideas of innovation, new technologies and blended learning discussed in the literature review to argue that it was worthwhile investing perceived barriers and benefits of innovation in teaching and learning.

At the beginning of the research, I needed to reflect on my position as the researcher and the values I held that could affect this, particularly in terms of bias or determination of judgements that I could make during the research. Creswell (2013) explains axiology as studying the theory of values focusing on what the researcher may value within the research findings. This was poignant, as I knew being a teacher and a researcher within the confines shaped by the aims and ethos of the school would be apparent in my research. This included, as set out in the background of this study, the school management's desire to innovate and my own views to incorporate more innovate practices within my own teaching. I felt I needed to be open and honest with these to ensure they would not affect findings or judgments later in the study. To mitigate this, it would be paramount to ensure the findings and judgements were based on data and evidence drawn from this. However, this did make me feel uneasy as in this study I would be drawing on the perceptions of participants through qualitative data, which was different to a repeatable scientific experiment that yielded quantitative data that I was familiar with. In planning and designing the qualitative analysis (detailed Chapter 6) the explanations of Gibbs (2007) and Ritchie *et al.*'s (2014) helped me to gain an appreciation of how I could use qualitative data from the interaction between people to build finding and judgements.

3.2.2 Exploring axiology

Coming from a background in taking a scientific research lens, I valued investigations that followed a logical systematic approach to determine or answer questions via experimentation to evidence the data. In Creswell's (2013) view of axiology, this would sit in the positivist paradigm, with a reference to determination, empirical observation or measurements in verification of theory. The explanation Philips and Burbules (2000) offer of a lens that offers a researcher a chance to verify a theory through a collection of data that will either support or refute that theory in my mind defines the scientific approach to research that I would use when testing a theory. Indeed, this idea echoes Punch's (2005) thoughts of the approach of positivism looking to observe facts in order to establish the truth as I did in this research by collecting pupils' perceptions and reactions. Punch (2005) argues that these perceptions of participants can be used to form rich qualitative data that can be used to justify findings, a concept I accept but took time to come to terms with.

As the research was bounded within the school, it would be influenced by the school's aims, decisions and policies (section 2.2), along with interaction with the pupils that I taught, meaning the role of people would be central to the research. This resonates with Neuman's (2000) thoughts on how interactions between people and systems make the interpretation of realities more difficult, suggesting a shift in point of view from the positivism towards interpretivism. Interpretivism is an approach that is more subjective as it sets out to understand the social interactions (Black, 2006) and interpretations of individuals (Carson *et al.*, 2001) within the research. As Hudson and Ozanne (1988) explain, it is not just the interactions of the participants, but the interactions between the researcher and the participants that lead to the generation of rich qualitative data. This would require careful consideration in the data collection

methods as I held dual roles as researcher and teacher. I would as the literature mentioned above highlights need to ensure my opinions, views and visions did not cloud judgements that I made. Indeed, this could open the study up to the possibility of bias and power relationships that are explored in further detail in Chapter 5.

As Creswell (2003) and Stake (2005) suggest, qualitative data analysis of these interactions between people allows a researcher to explore and build judgements based on participants' thoughts and opinions. Based on this understanding, I took a subjective approach to the research to examine the relationships between the people involved. I hoped this could allow for the development of an understanding into the situation during the research, as well as considering how this may have changed based upon the data I collected. This approach allowed me to gain an insight into answering research question four on what the attitudes to the CLP are based on the pupils' perceptions and reactions. The approach to meet this would need to focus on a process of interactions allowing participants to share opinions with me, which reflect Creswell's (2013) description of constructivism as an axiological paradigm for learning. It was imperative as Creswell (2013) mentions that these opinions are those of the participants and not my opinions. This and Stake's (1995) explanations of building qualitative data through interactions suggested I needed to use interviews as a method to collect pupils' data. I hoped this would then generate qualitative data through learning experiences of participants, rather than hard quantitative data from experimentation.

3.2.3 Exploring ontology

Considering a subjective approach would help to outline the ontological view within the study. The study sought to investigate the links between the pupils and the CLP used along with lessons in order to construct the pupils' knowledge in physics. Snape and Spencer (2003) and Ormston *et al.* (2014) define ontology as the nature of the world and what we can know. It concerns our beliefs about the kind and nature of reality and the social world (Richards, 2003). Ontology therefore allows the researcher to examine the theory of objects and their relationships within a study through a certain lens. The researcher then can categorise the objects within the study and examine their relationships within the domains of knowledge: cognitive, affective and psychomotor (Anderson *et al.* 2000). As outlined in the literature review (section 2.5), this study investigates the development of knowledge through the cognitive domain by structuring learning using a scaffolded approach through CL.

Reflecting on the explanation of O'Gorman and MacIntosh (2015) in stating a subjective lens or perspective looks at reality as made up of the perceptions and interactions of living subjects. I hoped the interactions between myself the two different years groups and four teaching colleagues would generate an environment that would enable me to understand their perceptions. Indeed, these perceptions shape reality through acts, attitudes, experiences, interpretations and variable behaviours. In this case, I hoped to uncover these in relation to their interactions with the CLP that was the mediating artefact used to encourage social interaction through CL in order to build an understanding of physics topics being taught.

3.2.4 Exploring epistemology

These perspectives and opinions were used to form the knowledge that was then analysed to build judgements from the research. This knowledge or data is key to understanding what was discovered from the study and so needs to be reliable and valid. Epistemology is the study of knowledge which Crotty (1998) defines as a way of looking at the world and being able to make sense of it. Snape and Spencer (2003) reflect this view by discussing the way an epistemological view will attempt to clear a pathway towards the possibility of attaining knowledge by exploring two opposing paradigms, positivist and constructionist, approaches to attaining knowledge. The positivist approach sees the researcher distance themselves to ensure they do not affect a study, explain Snape and Spencer (2003), as the researcher will not affect the truth or knowledge that already exists. Crotty (1998) further explains this by stating that meaningful realities and knowledge already exist in objects or in this case the participants. The constructionist approach sees Bryman (2004) explain how the researcher gathers knowledge through interaction with the social world sought through the exploration of interpretations and perspectives. This goes towards making knowledge personal, subjective and unique to the participants within the researcher's domain of knowledge.

The latter was required here as I acted as the researcher and teacher and used interactions with pupils to help develop an understanding of their perceptions and views. As outlined already I needed to ensure I did not represent my beliefs or vision through the judgements that I made and that the participants perceptions were analysed openly and honestly to not bias the study.

This demonstrated the approach that was necessary to complete this study and a need for me to move away from my scientific standpoint involving testing knowledge via experimentation. This study required did not required the investigation of interactions of participants between themselves and with myself that allowed knowledge to be constructed from perceptions and reactions. Reflecting on this process, I did not bring a theory to examine but I had instead set up an innovative teaching method using the CLP to discover emerged from the research. It would not be an exact science, and I felt this took me outside of my comfort zone.

3.3 Research Methodology

3.3.1 Considering personal experience: Action research

Having completed a MA in Education, I had experience of conducting educational research, which gave me an idea of a starting position. This position made me understand the principles of educational research, needing to clearly define a study: including the participants, methodology, ethical issues, methods for data collection, and ensure the reliability and validity of the study. Building on previous experience allowed for some direction when composing the research questions and initial design. As I began to consider a methodology to base upon, I reflected on my MA that was conducted as an action research study. O'Leary (2010), views action research as beneficial to a researcher looking to improve his or her own practice. Ebbutt (1985 cited by Cohen *et al.* 2011, p.346) also feels action research 'combines action and reflections with the intention of improving practice', while Noffke and Zeicher (1987 cited by Cohen *et al.* 2011, p.346), discuss the way action research can help teachers to 'increase their awareness of classroom issues', again allowing them to reflect on

their practice. Cohen *et al.* (2011, p.346), to conclude that action research is a 'significant vehicle for empowering teachers', argue that it is a flexible, situationally responsive methodology that offers rigour, authenticity and voice. As championed by Ofsted (2012), explaining the approach of action research offers development of teachers through a reflective practice.

3.3.2 Challenges in action research as a methodology

However, there are significant challenges with an action research study with issues focused on the accuracy and validity linked to the cyclical nature and the research outcomes of the study. The uses of action research cycles can take a long time as Tripp (2003) explains meaning as McNiff (2002) warns the researcher must be realistic in what he/she sets out to achieve. First in considering the length, this would have caused problems in this study as due to the academic timetable I would have been limited to ten weeks before a timetable change meant I would have a different group of Y7. Meaning I would not have had the same pupils that I started the study with had my cycles gone past this time. Whitehead and McNiff (2006) demonstrate that it is not just the practical turnaround time for the study but the need for time to establish accuracy and validity within the analysis, collection and interpretation of the data. This can lead a researcher to report on what they wish had been done rather than what has been done in the research leading to questions in the accuracy and validity of the study.

Marshall *et al.*'s (2010) primary concern questions the research outcomes explaining the practitioner requires a learning experience and resolution for a situation, whereas the researcher requires a learning experience but to gain new knowledge. This is a

consideration of any insider educational research (Mercer 2006) that sees the researcher's time split between completing the research and educating their pupils. Indeed Marshall *et al.* (2010) explain these as 'dual imperatives' (Marshall *et al.*, 2010, p.77) that require a balancing act which Brydon-Miller *et al.* (2003) explain require a collaborative approach making sure all stakeholders are engaged in the process. I addressed this by clearly setting out the research and seeking informed consent through an ethical protocol and explaining to the pupils the aims of the research to improve my teaching practice that in turn would benefit pupils' learning. Again, this brings into question the accuracy and validity of the research, requiring the approach explained by Whitehead and McNiff (2006) to ensure that data or evidence gathered demonstrates and backs up what the researcher has put forward.

In conclusion I decided that the action research approach would not fit the study. Through the research I was not seeking to see how well pupils were learning, but I wanted to investigate the perceptions of the pupils to build an understanding of how they used the CLP. I felt that I required an approach that would help me gain a bounded understanding at a fixed point rather than the idea of an approach that reviewed and reflected using different cycles.

3.3.3 Evaluation

Evaluation in its most basic form is a 'comparison between products or services' (Silver 2006); however, when it is used to look at education it becomes more complex and as Silver (2006) explains, it is used to acquire information on which to act. Scheernes *et al.* (2007, p.3) build on this, introducing the idea of 'systematic information gathering' allowing the researcher to form a judgment; this is an objective process which allows the researcher to gain an understanding of an intervention, how it was implemented

and its effects (Magenta Book, 2011). Cohen *et al.* (2011) focus on forming a judgment as a key feature of evaluation, which can be seen in the definition of evaluation which Morrison (1993, cited by Cohen *et al.* 2011, p.50) states as:

‘the provision of information about specified issues upon which judgments are based and from which decisions for action are taken.’

Ryan and Bradley Cousins’ (2009) view of evaluation as a methodological approach in education is that it should evaluate policies (e.g. the national curriculum) and programmes (e.g. schools’ schemes of work) which could lead to a decision on the effectiveness of them or to improvements and improved learning outcomes. This is backed up by Scheernes *et al.* (2007) who add to this view suggesting that evaluation can assist with accountability, regulation and supporting ongoing improvements in educational policy review. This could allow the review of a new method or style of teaching or the possible roll out of a new practice such as a CLP to have a way of being able to decide on its effectiveness and making use of the process to gain an understanding of why it was or was not effective.

3.3.3.1 Challenges and strengths of evaluation as a methodology

With these ideas in mind, I felt that evaluation might have been better suited as an approach to investigate research questions one and two with the aim of exploring and reviewing the notion of a CLP in English school ICT and why innovation was encouraged through school policy. The ideas of evaluation set out above would have offered a process to use to explore and review both questions to enable an understanding to be gained into the two areas.

When considering an approach to then investigate the CLP, Scheernes *et al.*’s (2007, p.45) suggestion of ‘school self-evaluations’ that use evaluation to review

implementations programmes with the goal of school or teacher improvement could have been used. Through this type of evaluation Scheernes *et al.* (2007) suggest that evaluation enables feedback to be focused on individual staff or whole departments which can be used to form development plans, teaching and learning strategies and for professional development. This seemed to offer a way of determining or judging the effectiveness of the CLP when used in teaching or how the CLP could have been used in the future. A key factor in this approach was the possibility to offer feedback that could have been used by myself or other teachers to improve teaching practice. However, from the explanations detailed on evaluation it did not seem that the approach would offer itself to fully exploring and discussing the pupils' perceptions as these existed outside of policy and judgements. The pupils' voice was a central theme of the research, as I wanted to develop the barriers and benefits to the use of CLP through their experiences and interactions with the CLP in their learning.

A further issue that could affect my research is reported by Scheernes *et al.* (2007) in discussing the trust and confidentiality, especially if policy is being evaluated. Macdonald (1993) goes further stating how the judgements around this can be distorted by the views of stake holders. This could have been problematic and called into doubt the validity of research; in this scenario an example could be how data was reported to reflect or please what the management would want to hear as ultimately, they have power over me as an employee. Although I felt I would be able to mitigate the issues surrounding the views of the stake holders, I believed that evaluation would not have allowed for the pupils' perceptions and reactions to be fully explored. The feeling centred on approaches evaluating policy, interventions and systems within an educational setting (Silver, 2006) rather than through interactions with the pupils that were involved.

3.3.4 Case study

The third and final methodology that I considered was case study as Thomas (2011, p.17) sets out a case study is 'especially good for getting a rich picture and gaining analytical insight' allowing problems to be solved or understood. That includes gathering data from participants on the phenomena under investigation from real world context or situations. I was guided by reading research case studies towards the three seminal researchers and writers in the field: Merriam (1998), Yin (2002) and Stake (2005). Their works built on the social science research of Parlett and Hamilton (1976) and Smith (1978) to form a range of approaches to case study. Literature implied that there was a wide range of approaches possible with the use of a case study methodology that suggested it had become a popular and well-used research social science and educational research.

The three seminal writers explained that case study was based on the constructivist paradigm, with a dependence on perspectives and judgements coming from the relationships between people, which fosters the development of new knowledge or gaining understanding in a process. Crabtree and Miller (1999) suggested that it is this approach which allows the participants in a case study to air their perceptions, leading to close collaboration with the researcher that can inform the study to gain this understanding. Gerring (2004, p.342) forms an idea of a definition of case study as 'research that investigates a single phenomenon, instance or example' leading to building an understanding within this case. The idea of the "case" is further explained by Eisenhardt (1989) making clear that the study has a focus on a single issue or intervention with the aim of the study explained by Yin (2002) to investigate what has worked, been achieved or the issues and dilemmas which have arisen.

Yin (2002) adds further detail outlining case study as a research methodology, which is a verifiable inquiry based on observation and experiences that can be discovered through the investigation. He adds a further dimension of context to the explanation, raising the importance of the context in which the research takes place and the effect this has on a real-life study. Stake (2002) builds on his earlier work (Stake, 1995) to frame this idea of context in his explanation highlighting the importance of the word 'case' within his definition, explaining the focus on what is being studied and how this relates to the world around it. This draws parallels with the ideas of Campbell and Stanley's (1963) single case properties where there are clear boundaries of the researcher's interests and the research is set within these boundaries.

3.3.4.1 Models of case study

In order to establish the path of the research first, an understanding of the different approaches to case study was required. I did feel overwhelmed to begin with when exploring case study with the numerous different approaches, perspectives and rationales that existed, but was aided by the works of Thomas (2011) and Yazan (2015). They offered further guidance on the three seminal writers Merriam (1998), Stake (2005) and Yin (2014) that helped to illuminate the different emphases that each had when explaining their approaches and perspectives on case study.

Yin (2002, p.14) defines case study as an 'empirical inquiry that investigates the case or cases'; this approach looks to use observation and/or experiences within the context of the case to address the how or why questions behind the study. Yin (2002) goes on to explain the need for a theoretical proposition behind each decision or process that the researcher uses in the study. Thomas (2011) and Yazan (2015) both explain the emphasis that Yin places on the design of a case study with a step-by-step structured

and tight design only allowing minor changes during the study. In my situation where I classed myself as a novice researcher this could be problematic as Yin (2002) explains that if significant changes are required then the researcher should go back to that start.

Alongside these requirements Yin also sets out the notion of a pilot case study, precisely planned steps throughout the inquiry and six suggested evidentiary data sources that should be used. Yin also differs from Merriam and Stake by combining the use of qualitative and quantitative data in the data gathering stages of the research. My concerns with a Yinian approach to case study were the rigid fixed steps and application of these towards the research study, as it did not offer the same flexibility as that of Stake (discussed below).

Merriam's (1998, p.8) approach to case study stems from an epistemological standpoint of constructivism that outlined case study as 'an intensive, holistic description and analysis bounded phenomenon'. This focuses on a single case that she defines as 'a single entity, a unit around which there are boundaries' (Merriam (1998), p. 27). This definition suggested that Merriam's key requirement is that boundaries around the case are clearly defined and if the research can define these boundaries then they can call it a case study. This is demonstrated by the wide range of examples that she gives for case studies including: a person, program, group and institution, suggesting her definition of a case is broader than Stake or Yin's. An area of interest within Merriam's (1998) explanation of case study and subsequent design was the comprehensive attention to detail to ensure reliability and validity as stated by Yazan (2015). Both areas are often questioned in social science research (section 3.3.4.2 discusses this further) and the techniques that Merriam sets out can be used to enhance reliability and validity and complement ideas suggested by Stake and Yin.

Merriam (1998) also emphasises the use of case study in educational research on innovative practices or programmes that demonstrate to the reader a description and understanding of the phenomenon that has been studied.

Stake (1995, p.2) explains case study as investigation to gain an understanding of ‘a bounded system’ that involves the

‘study of the particularity and complexity of a single case, coming to understand its activity within important circumstances’. Stake (1995), p.xi

Both this explanation and his later work (Stake, 2005, p.444) specifies how the case is a specific functioning thing, with a ‘singular focus set within clear boundaries’ and ‘an integrated system’. Thomas (2011) and Yazan (2015) identify Stake’s case study as a holistic overarching approach that deals with the interlinking relationships between the phenomenon and its context that works well when investigating study programme or people. Stake (2005) identifies three approaches to case study: intrinsic, instrumental and collective, as explained in figure 3.3.4.1a below.

Figure 3.3.4.1a - A table outlining the different types of case study – Constructed from Stake (2005), Baxter and Jack (2008) and Thomas (2011).

Case Study Type	Definition	Researcher
Collective	Where a number of instrumental case studies are used, to allow comparisons in relation to a particular phenomenon. Or more than one case is being examined	Stake (2005)
Instrumental	Is where case study is used to provide insight into a phenomenon; the case is not the primary issue as it facilitates the understanding of the phenomenon.	
Intrinsic	The exploration of one particular case to gain a better understanding of only this case and its results will not have implications on any others.	

The three Stakian approaches can be used as Baxter and Jack (2008) and Thomas (2011) suggest depending on the case and context that the researcher is investigating.

Applying this to my research case study meant I could rule out the use of a collective case study as I was only examining a single case. Stake's (2005) explanation of instrumental suggests an approach that uses the case as a tool to investigate something else, with the case itself being a secondary issue. Thomas (2011, p.120) builds on this, outlining that the case study is used as 'it facilitates the understanding of something else'. This aligns with Baxter and Jack's (2008) interpretation, where they further explain how this can be used to examine external interests or to support theory within the context outlined. This was not a course of action that I wanted to take in my study as I was very much interested in the case rather than external factors.

In contrast, Stake's (2005) rationale for an intrinsic case study is where the researcher's sole interest is focused on gaining an understanding of a single case, which Stake deems to be unique. The researcher needs to make clear what exists as their case within the research, clearly defining this and the boundaries that exist around this. Indeed, Thomas (2011, p.120) remarks that intrinsic case study could be 'termed blue-sky research' owing to the idea of that the research is to only find out about that one case. Baxter and Jack (2008) explain intrinsic case study will allow for the exploration of a unique situation, but the result may have limited generalisation or transferability (See section 3.3.4.2) to other contexts or settings due to the boundaries of the case.

In summary, the approaches of Merriam (1998) and Stake (2005) afford the researcher more flexibility as they can make changes during their study, as well as allowing more freedom in the design, data gathering and analysis within the case study. In the context of my study, the case was the physics classes in Y7 and Y12 and their perceptions and reactions towards the CLP that was being used in teaching and learning with the school's policy used to inform the case. Based on defining the case and setting out

the boundaries, I adopted an intrinsic approach to case study within my research and case study design. I also felt that I could adopt ideas set out by Merriam (1998) regarding enhancing reliability and validity of the study.

3.3.4.2 Critiquing case study

The three seminal writers all highlight generalisability, observer bias, reliability and validity as potential issues with case study research within their explanations. Sarantakos (2005) suggests the limitations of generalising data collected through case study research as each case study only covers a certain unique sample in a certain context at a certain time; therefore, its findings may not be representative of another sample in a different context at a different time. Indeed, Sarantakos (2005) does question whether this can allow findings to be generalised between studies or across theory. As do Lewis *et al.* (2014) discussing whether a study's findings have relevance beyond the context it is bound by or whether there is relevance outside of the research or sample. Stake (2005) does concede that you cannot generalise from case study; however, he does contradict this with the explanation of instrumental case study mentioning an idea that there could be some generalisation taken from a study. Yin argues that (2014, p.20) case studies 'are generalisable to the theoretical propositions and not to populations or the universe'. This allows researchers to build theories around their sample and findings rather than extrapolate or theorise for other samples. However, Stake (2005) suggests that not being able to generalise across case studies is a positive that allows the research just to focus on one phenomenon within a set context.

In relation to my study - although I was focused on the case in the context of my physics classes - I did want to inform teaching practice of other subjects through professional implications. This meant careful consideration would need to be used in analysing data and suggestions that were put forward. Indeed, as discussed in Chapters 7 and 8, further studies across other subjects may ultimately be needed to inform teaching in other subjects and schools, although there could be some transferability. This did make me reflect and question my scientific background in relation to using this methodological approach to produce evidence or results. Thomas (2011) outlines how a scientific phenomenon or theory cannot be based on a single experiment but requires a form of repeatability to confirm or evidence the theory. Hammersley and Gomm's (2000) comparison of case study to experimentation demonstrates this, highlighting how a case study within social science research investigates the relationships and process in the case that naturally occur without controlling any variables rather than through a strictly controlled scientific approach. Indeed, my own view of a scientific approach would echo Hammersley and Gomm's (2000) interpretation of experimentation, where the aim is to control the variables by using a single method which then allows for the causation behind a phenomenon to be investigated with data quantification as a priority.

Following this approach allows for generalisation; indeed, using multiple experiments replicated under the same conditions means that theory can be tested by repeating the experimentation. Within this realm of my case study this cannot happen due to the year groups moving on and conditions and pupils changing, so I have to accept that generalisation may not be possible, but there could be some transferability to similar contexts or settings within the school, an idea investigated in Chapter 7.

Bias, reliability and validity are all areas that are reflected on by the three seminal authors through discussing the processes of analysing data, gathering data, and validating data. Dealing with bias, Merriam (1998) highlights the positionality of the researcher and how they can bias a study through observer bias. Merriam explains, as I have done in this study in Chapter 1, that the researcher's background, beliefs and purpose of the study are well defined and clear to the reader. In turn this positionality allows the researcher to be open throughout the study to enable readers to judge the findings presented to see how conclusions were reached as well as aiding the reliability of the study. Observer bias links to the wider ethical issues surrounding bias based on the relationships between researcher and participants (Yin, 2014 and Thomas, 2011) which are explained and discussed in section 5.4.

Reliability is explained by all three authors as to whether you would receive the same responses if you repeated the study, or if someone else carried out the research. Yin (2002) explains how this can be achieved through research design with the methods, as Lewis et al (2016) echo stating the needs for clear logical and well documented data gathering. The reliability of the study was considered in the design of methods in Chapter 4 and in the reporting on the limitations of the study in Chapter 9.

As Stake (2005) suggests, validity allows the researcher to see if the test is accurately measuring what it should. The area of validity causes a difference of opinion between Yin (2002) when compared to Merriam (1998) and Stake (2005) that Yazan (2015) puts down to their differing philosophical viewpoints. Yin's (2002) positivistic stance aims to discover the accurate knowledge of the case, whereas Merriam (1998) and Stake's (2005) constructivism that reflects my standpoint, accepts that there are multiple views of the knowledge. These multiple views mean that there could be different perspectives, meaning unlike the Yinian approach there is no single correct

point of view. Although there is a difference of opinion in validity, all three authors are keen to achieve this, as am I in order to ensure my study is credible and able to answer the research questions I set. Of the three seminal writers Merriam (1998) goes into much more detail and offers the novice researcher a wide range of strategies and techniques to use when seeking to establish validity, which do reflect ideas that Yin and Stake also suggest. The three all highlight the different uses of triangulation; this takes the form of strategies that see the comparison between data sets, theoretical schemes, interpretation of the phenomenon and even multiple researchers. A strategy that I was able to adopt was Stake's (2005) suggested methodological triangulation, an approach through which I compared the data collected in this study from the pupil questionnaires, pupil interviews and teacher interviews using qualitative template analysis (section 6.4).

When collecting data Merriam (1998) suggests member checks where the researcher checks with the participant that they have correctly interpreted them to check the accuracy of their data. I did use this in the interviews where I summarised a participant's response to further question them and check I had interpreted their answers correctly. A final consideration was Yin's (2002, p.41) term a 'chain of evidence' which provides detail of every step of the case study from inception to completion that would allow another researcher to see what has happened. Although the Stakian approach I used did not require a set structure prior to research and was flexible, I recorded all the steps that I took, and these were reported in the thesis so I could be open and honest as to the interpretation of the data that I made and the formation of the conclusion through the judgements.

3.4 Summary of Chapter Three

In this chapter I have explained the case study methodological position taken for the research, highlighting my own views and position within the areas of Axiology, Epistemology and Ontology. I have outlined the difficulties that I found coming from a scientific background to this type of research where the data is constructed through the interactions between the pupils and myself as the researcher and teacher. This saw a constructivist position that required the process of interaction, allowing participants to share opinions that in turn produced the data that I hoped would demonstrate pupils' perceptions and reactions to the use of CLP in the physics curriculum. The next chapter sets out the Stakeholder approach adopted through the defining of the case, outlining the research design and explaining how the data collection processes were designed and implemented.

Chapter four: Research design and methods

4.1 Chapter outline

This chapter details the research design following a Stake approach to case study that was explained in Chapter 3. This first ensures that the case is clearly defined and bounded, explaining the choice of insider research and selection of the pupils and teacher participants before clarifying the steps taken in the study. The research design of case study is subsequently explained with a detailed explanation of the two methods chosen for data collection and the practices carried out to implement these. The use of online questionnaires and interviews raise ethical issues that are highlighted before Chapter 5 explains the ethical protocols used to protect the participants and researcher.

4.2 Defining the case

Although Merriam (1998), Yin (2002) and Stake (2005) hold different views on the framing of a case (discussed in section 3.4), all agree that the case must be defined and bounded (Smith, 1978) prior to research. In this research the case was defined as the school; this was set due to the investment and policy direction that the school's management have adopted to incorporate ICT and innovation into teaching practice within the curriculum. The year groups were indicative of the case, the two-year groups were chosen to offer two examples of pupils with different learning experiences at different points in their learning and were not separate cases. The choice of insider research was to enable an element of investigation with the aim of self-improvement within my own teaching practice and to allow a discussion around the school's policy.

4.3 Further background to the study

As set out in Chapter 1, the school's management promoted innovation through the school's curriculum. I combined traditional methods with innovations (explained in Chapter 2) reflecting a blended learning approach (Bogan and Ogles, 2016) to adopt an innovative approach in my own teaching practice. Over the past two years I had developed the notion of a CLP (defined in section 2.6.5) that incorporated CL and ICT with the aim to aid pupils' learning. It was through this research that I hoped to develop my teaching practice and understand whether there were barriers or benefits to innovating in the classroom.

I chose to use Y7 and Y12 pupils in this research along with four teachers at the interview stage. The reasons for the choice of the year groups were: neither year group had public examinations; Y7 were new to the school and had an updated modern curriculum; and the Y12 pupils were at the opposite end of their schooling having experienced five years at the school and having had a more traditional curriculum. As the Y7 pupils were new to the school, I hoped they would be open minded towards the research. Their modern curriculum had also been designed to encourage teachers to innovate using ICT to incorporate their one-to-one tablet devices in lessons across the curriculum. The Y12 pupils had experienced a traditional curriculum in their five years at the school, taught by teachers using generally more traditional methods, although innovation was encouraged. They did not have school one-to-one devices as these had been brought in recently; however, Y12 pupils have access to devices in school with the use of ICT labs or their own personal devices.

This was not designed to be a longitudinal study and chart the progress of the Y7 through the school or make judgements that the Y7 pupils would become like the Y12 pupils when they reached that year. The two-year groups were chosen as different

year groups and indicative of different years in the school. The aim was that they may provide an insight into their reactions allowing the benefits of - and barriers to - a teaching approach using the CLP to be established.

The Y7 pupils began their physics course at the start of the research, I had previously taught the Y12 class for a term before starting the research but used a more traditional curriculum, with the use of the CLP started at the beginning of this study. The Y12 pupils, apart from two new pupils, had been at the school for five years and experienced physics up to GCSE, again taught in a more traditional manner. With both year groups I used a CLP specifically designed for each year with the aim of aiding their learning that included several resources; design was based around the literature on ICT and blended learning in Chapter 2. (Appendix A contains a sitemap and screen shots of the CLP used in this study.) It should also be noted that the Y12 pupils had completed a study skills course in Y11 with a focus on CL which was followed by lessons that incorporated CL; the Y7 had not taken part in this course.

I chose to include teacher interviews to broaden the range of data and allow for a different perspective on the use of the CLP. The concept of case study that Stake (2005) explains uses a broad range of data to investigate the case that will allow for the comparison of data that can then be used through triangulation. I believed that using the pupil online questionnaires, pupil interviews and teacher interviews would provide a range of data that could be compared through the data analysis process.

The teachers chosen were the four other teacher in my department, they had a range of age, background, gender, and time spent in teaching. The teachers also taught the same year groups and topics that I was teaching, so it would allow for a comparison of approaches in these areas. I hoped that the teacher data could help to shape

professional development relating to the CLP (research question 5) and this could enable me to share good practice of how I used the CLP.

4.4 Case study design

Following a Stake approach, the case study design began with defining the case as 'a bounded system' (Smith, 1978) as set out in section 4.2 that then allowed the development of research questions. The idea of a bounded context was key in the decision to use case study for the study to focus on a specific case at a specific point in time. As Yazan (2015) suggests, the research questions must be drawn up in order to set out the path for data collection, which then allows the researcher to 'tease out the problems of the case' (Yazan, 2015, p.140). Adopting a Stake approach allowed a certain amount of flexibility that includes changing questions or the research focus if required. This flexibility, as suggested by Stake (2005, p.22), suggests this is to allow for unseen circumstances; he cites Parlett and Hamilton who explain that 'the course of the study cannot be charted in advance', meaning the researcher may need to reconsider the focus or follow up on emerging issues and unexpected issues. This is contrary to a Yinian approach where the research is set out in rigid steps not offering flexibility and a change in focus requires a completely new case study.

Following the identification of the case, I carried out a comprehensive literature review of the areas around the study, including collaborative learning theories, educational policy focused on ICT in the curriculum, innovation in teaching and learning, and the school's policy. This led to the design of the initial research questions which allowed for consideration to turn to data collection methods. Stake's (2005) approach does not put a time frame on when the data collection or any other stages need to occur.

However, in reviewing a Stakian approach, Baxter and Jack (2008) and Yazan (2015) stress that research questions must be known prior to data collection for the methods to be designed to collect data that could answer the questions. I continued to develop the research questions using literature and discussions with my tutors until I had the five research questions listed in section 1.5.

My attention then turned to the data collection methods; as suggested by Stake (2005), I ensured these were carefully designed, planned and prepared in order to be as effective as possible. Sections 4.6 and 4.9 detail the design, reasoning and selection of how online questionnaires and interviews were used as data collection methods. To further demonstrate when these were used, the timeline below in Figure 4.4a outlines the data collection process.

Figure 4.4a Timeline to show preparation, teaching with the CLP, questionnaires and interviews.

Before teaching with CLP	Teaching using the CLP with Y7 and Y12 During the Easter term				After teaching with CLP
	January	February	March	April	
<ul style="list-style-type: none"> - Thesis proposal - Literature review - Research design - Ethics - Planning - Methodology - Method selection <p>Informed consent from parents and pupils obtained.</p> <p>Pilot of online questionnaires in December</p>	<p>Introduced new topics with CLP supporting teaching.</p> <p>Online questionnaires completed by end of first teaching week</p>	<p>Teaching using CLP</p> <p>Review of questionnaire responses</p> <p>Analysis of online questionnaires to inform interview questions</p>	<p>Teaching using CLP – completed towards end of month.</p> <p>Interviews piloted and questions tested</p>	<p>Interviews carried out with participants (began at end of March)</p> <p>Data analysis started</p>	<p>Data analysis leading to further work on thesis.</p>

There were two stages of qualitative data analysis, the first following the online questionnaire, which helped to establish background data and provided further areas to investigate and follow up in the interviews. Again, this was an advantage of the

flexible approach that Stake (2005) allows in his case study approach. The second stage followed the interviews, to analyse the responses of the pupils and teachers; both are fully explained in Chapter 6.

The final aspect of the case study research design was to examine the reliability and validity of the data collected. Both areas are discussed in Chapter 3 when selecting the methodological approach for the study, and then discussed in relation to the collected and analysed data in the conclusion (Chapter 7).

4.5 Sampling

Section 4.3 built on section 1.3 detailing the choice of the two-year groups asked to participate in the study. As explained, they had different backgrounds based on their range of academic abilities, gender and SEND. In Y12 the range of academic abilities was demonstrated by the pupils' GCSE results; three of the fourteen pupils were girls, two pupils had English as an Additional Language (EAL) and three were listed on the school's SEND register. The Y12 pupils those involved in the study were a fair representation of the forty-two pupils who studied physics A-level but not across the year group of 165 pupils.

In Y7 the range of academic abilities was demonstrated by the pupils' school's pre-entry testing in English, Mathematics and verbal reasoning. The gender mix of the class was 50:50, there were a total of five pupils with SEND in the class (in the year group sixteen pupils were listed with SEND). The Y7 pupils were a fair representation of the sixty-six pupils across that year group. As previously suggested by Stake (2005), case study tends not to enable generalisability and from the background of the Y12 pupils it would certainly be hard to claim generalisability from the sample used.

In total a possible thirty-six pupils could have been involved in the study with twenty-two from Y7 class and fourteen from Y12 class. Across the literature and research, I had read that there was no suggested number for a case study but only the outline that enough data was needed for qualitative analysis (O'Leary, 2010). Further discussion with my supervisors suggested that the sample group would be large enough, and that it would be possible to accept and analyse data from the whole sample if they all completed the online questionnaire. However, if all pupils had opted into take part in the interview stage a sample would have been selected through purposive sampling based on the backgrounds above rather than convenience sampling as 36 interviews would not have been feasible.

Each of the thirty-six pupils had the chance to take part in the online questionnaire by giving informed consent by following the ethical protocol set out in Chapter 5; having completed and submitted this with their parents' permission, they were then sent a link to the initial questionnaire. In total thirty-two pupils - eighteen from Y7 and fourteen from Y12 - gave informed consent and completed the online questionnaire. The final question in the questionnaire asked if pupils would take part in the interview process; eight Y7 and seven Y12 consented to take part in the interview process meaning fifteen pupils in total. Following discussions with my supervisors we believed this number would be manageable in terms of the data it generated, and we would reassess this once the data was collected and the analysis process started in case there was not enough data.

As explained in section 4.3, I also chose to interview four teachers from my department in the study. I chose all four teachers as they had a range of age, gender, time in teaching and time teaching at the school. By including all four this meant I did not risk biasing the sample by choosing just two or three and I did not want to upset any by

not asking them to take part. In the same way I sought informed consent and permission from the pupils to take part I also followed the guidelines set out in Chapter 5 for the teachers.

4.6 Questionnaires

4.6.1 The nature and design of questionnaires

Merriam and Tisdell (2015) suggest that questionnaires tend to be used as a method in quantitative studies; indeed, explanations of case study research given by the three seminal writers all imply that interviews are the primary method of data collection. However, Gibbs (2007) and Ritchie *et al.* (2014) discuss the merits of questionnaires as a method for screening and collecting background data that may inform a qualitative research. As Opie (2009) and Stake (2005) demonstrate, questionnaires do indeed allow participants to give detailed responses that can be drawn into conclusions and judgments in qualitative research. As explained in section 4.4, I wanted to use interviews as it was a way to collect data from several participants that would inform the study about their backgrounds and understanding, and to suggest areas I needed to follow up in the interviews that followed.

Opie and Creswell (2013) imply that for any questionnaire to be successful it needs well-crafted questions that will allow the researcher to access the responses they require. I reflected on Opie's (2009) suggestion of two preeminent styles of questioning: open and closed, where careful design is required in order to ensure participants respond to questions with enough information to aid research but where the question does not lead them to give an answer desired by the researcher. This notion reflects Dawson's (2009) explanations of a questions structure, where I needed to consider how to ask a question that would provide an insight into an area I was interested in.

4.6.2 Strengths and challenges with questionnaires

The basic data analysis functionality also allowed for quick analysis that was followed by a further in-depth approach allowing for grouping of answers and reviewing questions. I hoped that the questionnaire would be a good method and provide me with the raw data I required. However, one concern Opie (2009: 110) argues regarding the disadvantage of questionnaires is:

‘...they are not good for answering the question ‘Why?’ This is much better achieved through direct communication...’

Although the questionnaire here was used as a preliminary questionnaire to gather initial perceptions, opinions and views, I did expect there to be some gaps in the information collected. For the second data collection after using the CLP, I planned to use interviews. I hoped that interviews could be used to follow up points of interest from the questionnaire and that they would allow for discussions around further perceptions, opinions and views from later in the study.

The preliminary questionnaires online were chosen as they allowed me to sample a large group asking identical questions and provided me with a manageable way of collecting and analysing the data. These offered me the chance to question all those within the sample (section 4.5); it also meant the responses were anonymous and confidential as further discussed in the Ethics Chapter. Cohen *et al.* (2011) highlight this as a benefit as the belief is that participants will be open and honest with the information given, as the participant is not identifiable. Indeed, this method did prove successful as all participants in the Y12 group (14/14) and 18/22 participants in the Y7 group returned a questionnaire with most questions answered. Wang *et al.* (2011) demonstrated one drawback to the approach of questionnaires, which is how vague answers to questions can need a further round of questionnaires or follow-up

interviews can be required. However, if the questionnaires are anonymous, they cannot be followed up, meaning you would potentially miss valuable information. To try to mitigate this I followed ideas from Cohen *et al.* (2011), Dawson (2009), Opie (2009) and Thomas (2011) when designing the questionnaires. I also piloted the questionnaires and interviews, as explained in section 4.7.

4.6.3 Strengths and challenges with online questionnaires

The benefits and issues in using questionnaires are explained above; however, in my research I added a further dimension by making use of online questionnaires.

I was able to make use of the benefits of online questionnaires with Accuracy, administration speed, anonymity, and flexibility in data analysis. The accuracy of the online questionnaire was that what I received was a transcript written by the participants, minimising any transcription errors or mistakes I could have made. Administration speed was a benefit as I was able to send questionnaires out quickly, and participants could complete them at a time that was convenient to them and then send their responses back. The online questionnaire platform offered flexibility in data analysis as I was able to filter and sort responses, for example by year group and then quickly compare answers without having to go through pages of notes. The online questionnaire allowed for participants to remain anonymous compared to face-to-face questionnaires; I hoped this would allow them to be open and honest without feeling pressured as they may have been in a face-to-face situation.

The issues involved in using online questionnaires included: bias, data protection, follow-up and verifying identity. Using online questionnaire could have possibly caused bias as a participant with poor ICT skills or no access to the internet may not be able to access it or complete. To mitigate this, I offered all participants the opportunity to complete the questionnaire on paper if they wished. Data protection and the security

of personal online data were important considerations in the study and covered through the ethical protocols (Section 5.6.2) that I used, in line with GDPR (2018). In certain instances, using questionnaires benefits a researcher (Dawson, 2009) as they can follow up on a given answer that may not have been expected. Although a negative of using online questionnaires does not afford this, I had considered this and that is why interviews were used later in the study enabling area of interest to be followed up.

Using an anonymised online questionnaire meant it may not be possible to verify the identity of who has completed, meaning they could have submitted responses to multiple questionnaires. I was able to make use of a setting on the software that only allowed one response from a certain device via the internet, meaning it was less likely a participant would submit multiple entries as they would need several devices and several internet connections.

4.6.4 The design of questionnaires used in the study

I used a range of questions incorporating a mixture of open and closed questions along with combining multiple choice and Likert scale options in order to gain as much information as possible from the participants. (Appendix D contains a copy of the questionnaires.)

I tried to structure questions clearly to ensure all participants could access questions and understand what they asked. I followed Thomas' (2011) idea of refining questions to ensure that the question is to the point and to maximise the responses from participants. To do this I focused on how the question was posed using the question stem and language used, whilst incorporating Patton's (2015) question design. Patton (2015) suggests there are six types of question, each based around the language or

stem used when posing the question. I made use of Patton's opinion and values questions that Merriam and Tisdell (2015, p.118) cite stating '... here the researcher is interested in a person's beliefs or opinions...'. This type of question uses "How..." and "What..." stems that I hoped would draw out pupils' perceptions and reactions in the areas of ICT, CL and their background skills from the questionnaire.

In certain areas I used closed questions: either multiple choice or Likert scale questions. The rationale for this choice came from Cohen *et al.*'s (2011) discussion of how different ideas given from different respondents can be vastly different and are unlikely to be the same. Although I did not want to lead participants to give certain responses, Cohen *et al.* (2011) explained that this type of question could give a reduced choice allowing pupils to choose but confine it to a selected sample of answers that allowed for comparison or analysis. For example, when it came to confidence in using ICT, I used a four-part scale as this would give a big enough range of insight into the participants' views but stop long open-ended answers that did not inform the study. These multiple views would have been hard to aggregate or link together as the questionnaire was designed to gather initial perceptions and views on a range of areas that could be followed up in the interviews. A four-part Likert scale was used following advice from Cohen *et al.* (2011) as odd number scales tend to lead to the skewing of data. This happens as respondents tend to opt for the middle option as it can be the least controversial or neutral in their mind. Further investigation of their response could be followed up in the interview.

4.7 Piloting

Stake (2005) recommends piloting data collection methods that will be used in a research study to allow the researcher to become familiar with that method and develop an understanding of the data it may deliver. Yin (2002) goes further by recommending a complete pilot case study be carried out, arguing that this allows the researcher to refine procedures that will be used and trial the data collection methods. Merriam (1998), Dawson (2009) and Cohen *et al.* (2011) all advocate the use of piloting for a researcher to test data collection methods to see how they work and the results they produce.

Having selected questionnaires and interviews, I wanted to know if the questions worked by allowing participants to deliver relevant responses that could lead to answering the research questions. A key idea was to test the actual questions, seeking to understand whether these made sense to the participants, what responses they gave and how much data would be generated. Following the notion and guidance set out by the literature of those above, I selected a pilot group of my ten tutees. I was able to gain an idea of the types of responses, the information they contained, the length/amount of data collected, and the time taken to answer the questionnaire. I followed Dawson's (2009) advice of asking the pilot group about the questionnaire to find out if it made sense and was easy for them to answer. Through this process I changed the order of questions, redrafted some questions and introduced shorter answer spacing (textboxes) for some questions to focus pupils' responses. I took the idea of the different textbox sizes for answers from Cohen *et al.* (2011) and Thomas (2011) when they discuss ensuring participants' answers are concise and do not contain unrelated writing that they feel they need to give to just fill the space. I used literature in the design of the questions to help ensure the questions were succinct

and simple in terms of sentence structure to allow all pupils to access the questions independently. I was also able to combine two questions and remove a third, meaning the questionnaires' length stayed within the five to ten minutes I set for its completion. In a similar manner I piloted the questions that I used in the interviews to again check the responses I could receive, see if questions made sense and gain an idea of the time the interview would take. To do this I used three of my tutees and I believe this helped to develop the questions and my interview technique.

4.8 Using the online questionnaires to inform the study

The interviews were also used to help the study in three ways. The first was to allow the background information on ICT and CL to enable me to understand the pupils' skills in these areas. I felt that I needed to know whether they had basic ICT skills to allow them to access the CLP if they chose to and whether they had an idea of CL so that if they wished they could work together using the CLP. For example, the online questionnaires demonstrated the difference in the understanding of CL between the Y12 pupils and those in Y7 as explored and investigated later in Chapters 7 and 8. I was then able to tailor my teaching with both year groups to ensure that they all had the necessary skills to access the CLP and could make their own choices as whether to use the different areas of the CLP when completing their work or homework. I felt that this would not impact the study as I was not enforcing them to use the CLP or CL with their homework, but they did need to have an appreciation of what CL was to access this.

The second way that the questionnaire informed the research was in helping to plan questions that were used in the interview, for example in responses to question 3 that asked, "What do you think CL means?" Y7 pupil mentioned cheating and copying. This

response was the widespread idea across seven Y7 pupils but was not replicated in the Y12 data or in the literature on CL that I had reviewed. This felt significant and I believed it required further investigation to understand how Y7 pupils had arrived at this conclusion. So, planning the interviews I incorporated questions to try and understand why they perceived this as they did not offer explanations of this in the questionnaire responses. This demonstrated the purpose of the questionnaire being able to inform the interview process by developing questions that would explore areas of interest that arose. In the interview schedule in Appendix E, I have put in the questions informed by the questionnaires and made notes to myself regarding these, for example, question 1b below.

1b. Pick up on any key points or words (Idea of working together/helping each other/sharing knowledge or skills/ideas 3rd form had of cheating).

The final way the background questionnaires informed the study was to assist in redefining the a priori themes. The initial a priori themes that were used in analysis are set out in section 6.6, along with the explanation of how the higher-level and sub-themes were chosen and developed. These were tested in the analysis of the online questionnaire and subsequently refined following the process as set out in section 6.10. The online questionnaire proved invaluable allowing me to test my analysis and gain an understanding of pupils' background skills, preconceptions and thoughts going into teaching using the CLP.

4.9 Interviews

4.9.1 The nature and design of interviews

Patton (2015, p.426) describes the purpose of an interview to ‘...allow us to enter the other person’s perspective’, as Merriam describes, this can enable a researcher to have the opportunity to understand the unobservable, such as beliefs, feelings and perspectives. This was my ultimate desire with the interviews in this research having two aims: first, to follow up on areas of interest drawn out from the online questionnaires and secondly, to construct an understanding of pupils’ perceptions and reactions to the use of CLP. Merriam (1998), Stake (2005) and Yin (2014) all suggest that interviews are a key method of collecting data in a qualitative case study as they allow for the conversations between researcher and participant described above.

Yin (2014) goes on to back up this argument by explaining they allow for fluid conversations between the researcher and participant that can draw out important data. The use of interviews to gain rich qualitative data expressing the opinions and views of participants is demonstrated in the research of Veenstra *et al.* (2009), Kvale and Brinkman (2009) and Wang *et al.* (2011). In order to do this Stake (2005) suggests it requires the skills and understanding of a proficient researcher to identify, recognise and test the data using this method. Stake (2005) does not elaborate on the details of interview design, whereas by contrast Merriam (1998) offers a research and in-depth overview of how to plan, prepare and conduct interviews. The wide-ranging literature of Gibbs (2007), Opie (2009), Thomas (2011) and Ritchie *et al.*’s (2014) also offered further perspectives on the design and delivery of the interview process. Merriam and Tisdell (2015) suggest that the type of interview used depends on three values: structure, single or multiple participants, and theoretical stance. However, in this study

there was no overriding theoretical stance that meant this was not a consideration in the interview structure.

4.9.2 Strengths and challenges with interviews

Merriam (1998), Stake (2005) and Yin (2014) all describe how interviews offer the benefit of rich qualitative data capture, with Stake (2005) highlighting the personal beliefs, thoughts and understandings that can be delivered. Thomas (2011) describes how the conversation and interactions between the interviewer and interviewee work as a process to produce this rich data.

Despite the possible benefits, interviews also present a series of challenges based around the ethics of bias and power relationships formed around the interactions stated above. Bias emerges as an issue based around the nature of questioning, types of question and the structure that can make questions leading or motivate participants to answer in a certain way. Power relationships are created through the dynamic of the participant and researcher, and in this research, there could be extra pressure as I hold the dual roles of researcher and teacher. Both issues are addressed in the structure and design of the interviews outlined in this chapter and expanded upon through the ethical protocols introduced in Chapter 5.

4.9.3 Structure of interviews

Merriam (1998) offers the researcher an in-depth overview of how to design, plan and prepare interviews, complimenting Stake's (2002) approach to produce rich qualitative data. Through her later work (Merriam and Tisdell, 2015) Merriam refines the structure of interviews, further highlighting question design with the use of Patton's (2015) good questioning techniques. Thomas (2011) suggests the structure of an interview is

dependent on the type of questions and how these are crafted, leading to him identifying three variants: structured, semi-structured and unstructured interviews.

Across educational research each approach has pros and cons being argued for and against as demonstrated by Gibbs (2007), Opie (2009) and Thomas (2011). Their arguments present common themes across literature for and against the use of structured and unstructured interviews. In favour of structured interviews, they argue that this approach means the interviewer sticks to an exact script and the same questions are asked each time, which has the added benefit of allowing for direct question comparison in data analysis. However, they counter this by arguing that this form of interview can be too rigid, not allowing the researcher to go off script to pick up on unexpected or interesting responses that are given. The reverse arguments are then presented with unstructured interviews that include the argument for an experienced researcher to use them in order to maintain focus and ensure certain areas are explored, rather than the interview ending up being just a conversation.

Both approaches had issues and I felt they would not offer a set of questions I wanted to ask but the flexibility to follow up on points. Therefore, I opted for the middle ground and chose semi-structured interviews as outlined by Merriam and Tisdell (2015). This approach offers the researcher a structure, meaning a certain set of question are asked that allows for question-by-question analysis, with the added benefit of being able to follow upon points of interest or answers. This was particularly important in my research as through the online questionnaires I had identified areas I wanted to further explore in the interviews and this structure allowed for this to happen.

The second factor Opie (2009) and Thomas (2011) identify in selecting the appropriate interview structure was whether single or multiple participants (group interviews/focus groups) are questioned at the same time; for this research I chose to use individual

interviews. Merriam and Tisdell (2015) suggest the benefit of this style of interview is the construction of answers through the interaction of the group sharing thoughts and the discussion that follows. However, sensitivity and the dynamic of the group are the negative issues highlighted by Dawson (2009) and Opie (2009). Not all participants feel comfortable talking in front of others, meaning they may withhold information, especially if it is personal or on a sensitive topic. Dominant or overwhelming personalities can also take over a focus group dominating the conversation, which means that not all voices are heard. In this study I was concerned with both issues as I felt not all voices would be heard due to the personalities of those involved and pupils may not wish to discuss their confidence or whether they struggled with something in front of their peers.

4.9.4 Design of interview questions

At the heart of the interviews are the questions, as stated across the research and highlighted by Merriam and Tisdell (2015). They go on to cite Patton (2015) in the construction of good questions where he suggests six types of question that a researcher can use. Through my research I found these six types of questions were prominent and the language used in question stems that Patton (2015) suggests was widespread. I had identified that the “feelings, knowledge and opinions and values questions” from Patton’s (p. 118, 2015) six types of questions reflected the types of responses that I aimed to gather from my interviews. Figure 4.8.4a below displays examples of questions from the interviews following the design of Patton’s (2015) six types of question model (Appendix E contains a copy of the interview questions).

Figure 4.9.4a – Examples of types of question used in the interviews based on Patton’s (2015) six types of question model.

Question number	Question	Type of question
1a	What do you think the term collaborative learning means?	Knowledge
3a	How do you feel having a dialogue/speaking to other students about your work? Do you feel it affects your understanding of the work or develops your skills?	Feelings
6.	What are your thoughts and reactions to the introduction of the CLP which we have used over the course of this term?	Opinion and values

Question 1a demonstrated the use of a knowledge question designed to gather factual knowledge from the pupils on a specific area. Question 3a was an example of a feelings question that looked to collect adjective responses, conveying views of the participant’s feelings. Question 6 was designed to allow the participant’s beliefs to be demonstrated using an opinions and values question.

The question design ideas were coupled with further guidance from Yin (2014) that allowed consideration of the tone of the questioning. As Becker (1998, cited by Yin 2014) suggests, certain question stems can lead to different responses along with the language used. This is demonstrated in his belief in using the “how...” approach to a question rather than a “why...”. This follows the belief that the “how” questions can be perceived as more friendly compared to “why...” as participants tend to generate defensive response to a “why” question. This reflects Patton’s (2015) advice when warning researchers against using “why...” questions that can lead to dead-end responses or speculative answers.

4.9.5 Interview setting and good practice

This also made me consider the setting of the interview, as I had decided on one-to-one interviews, I wanted the pupils to be comfortable and relaxed so decided to use a school interview room rather than the physics classroom or my office. Indeed, Cohen *et al.* (2011) recommend a neutral location, agreeing with O'Leary (2010) that this can relax participants and ensure it does not feel too formal. This can also help to reduce power relationships that could be located with certain settings and reduce bias. As the school setting was a boarding school with longer hours than a day school, there was enough time to carry out interviews at times that suited the pupils or teachers involved. As previously with the questionnaire, I considered carefully the length of the interviews and followed guidance to keep them to around ten to fifteen minutes; as Dawson (2009) suggests, this amount of time allows for participants to remain focused and any longer may mean a loss of concentration or boredom.

I followed the good practice for interviews suggested by Cohen *et al.* (2011) in ensuring I listened, conveyed positive body language and tried not to speak too much myself, other than asking the questions or a follow-up question or reassurance. I hoped this would allow the interviewee to express their own views rather than regurgitate something I may have said. I hoped that without interjection or myself leading the conversation this could help to prevent bias (Cohen *et al.*, 2011).

4.9.6 Recording and transcribing interviews

I chose to record the audio from each interview with the permission of the participants; I felt this was the most effective way suggested by Merriam and Tisdell (2015). This belief was based on the fact I could maintain eye contact, listen to the participant without taking notes, interact and ask questions during the interview's key points - all

concepts promoted in the literature on good practice of interview technique (Dawson (2009), Opie (2009) and Cohen *et al.* (2011)). Merriam and Tisdell (2015) argue that to begin with a researcher may not know exactly what they are listening/looking for in an interview and the use of recordings therefore allows them to go through an interview multiple times to review the content. I felt this was the biggest advantage of this transcription method, as I could replay the interview whilst I produced the transcripts. This meant I could review and check transcripts for accuracy and errors that ensured each participant's data was correctly recorded, a key point stated by Dawson (2009) and Merriam and Tisdell (2015).

Dawson (2009) and O'Leary (2010) discuss what should be recorded in the transcript from an interview, whether to include expressions, pauses, "umms" or "ers" and body language. Both believe that context can be added to the interview and indeed these nuances may give away further feelings that the participant had in response to questions. Indeed, Morrow (2005) and Merriam (2009) feel that a small amount of editing may be needed to make the interviews comprehensible, but participant responses should really appear in their original and unedited form for authenticity. However, the counter argument is offered with Cohen *et al.* (2011) stating they can offer confusion or may make the transcripts hard to follow when reading. I took the approach to include pauses, "umms" or "ers" and repeated words as I felt they added context to the interview and displayed how quickly or confidently they could answer. I chose not to include details of body language proposed by O'Leary (2010) as I did not feel comfortable commenting on this and felt observing this would take my concentration away from the interview discussion.

I followed a similar process with the questionnaires by not changing or editing the responses other than to alter spellings of words to make the transcripts readable,

following the thoughts set out by Morrow (2005) and Merriam (2009). Indeed, as Dawson (2009) outlines, by minimising editing it helps to produce accurate, error free transcripts that reflect the participant's thoughts and views. Appendix E contains three interview transcripts and a blank interview schedule.

4.10 Summary of Chapter Four

This chapter has detailed the research design following a Stakian approach to case study. This began with a clear definition of the case that the study was based upon with further explanations of how this was framed by the school; details of the steps taken through the case study along with a timeline to present when the data collection and analysis took place after the initial research design to produce the research questions. The data collection methods used have been critiqued, followed by an explanation of the design of each method and how they were administered, including how pilots were used to refine each. This raised ethical concerns that needed to be addressed prior to data collection that are discussed in the ethics chapter that follows (Chapter 5). Subsequently, Chapter 6 then introduces qualitative data analysis ahead of the research data being presented and analysed in Chapter 7 and 8.

Chapter Five: Research ethics

5.1 Introduction to ethics

In undertaking this research, the British Educational Research Association (BERA) (2016) guidelines for staff research in education were followed, along with the ethical guidance, permission and processes from the University of the West of England (UWE, 2020). The Faculty Research Ethics Committee (FREC) form outlining permission for the research and processes to be followed is in Appendix C. This chapter sets out to explore the ethical issues that needed to be addressed in planning and carrying out this research study. Following gaining permission from FREC, the key areas that are discussed are: gaining permission from the case school, informed consent from the participants, anonymity and confidentiality, the position of the researcher regarding insider research, power relationships, and the right to withdraw.

This required the design and production of an ethical framework to operate within. I made use of the comprehensive literature around the areas of ethics in education directed by BERA (2016) and several authors mentioned throughout this section. The starting point that I used was Willimen and Buckler's (2010) suggestions to consider the four aspects of: proposal, potential, permission, and protection. The research was set within my own workplace, with the pupils I taught, and focused on my own teaching practice; reviewing literature I found this fitted the description of insider research that Merton (1972) and Griffith (1998) outline. Both suggest insider research occurs when the researcher is familiar with the settings and has an intimate knowledge of the group or setting where the research is taking place. Merton (1972, p.11) suggests that this gives the researcher 'privilege', allowing them to access knowledge or data that an outsider would not be able to due to their familiarity with the context of the research.

Both authors explain that this requires careful consideration and planning, as demonstrated in Mercer's (2007) research study where she had to consider the dual role as researcher and practitioner.

5.2 Ethics of insider research

The research study set out to investigate the benefits of, and barriers to, using CLP in teaching physics within a case study school that used my Y7 and Y12 physics classes. Using insider research can offer benefits as both Merton (1972) and Griffith (1998) explain with the researcher holding relationships with those involved in the study or already understanding the setting. However, Herr and Anderson (2014) explain that insider research changes the dynamic, placing an emphasis on the relationships between researcher and participant as the researcher holds dual roles in this situation as teacher and researcher. They state that this can lead to ethical issues around bias, informed consent and power relationships due to the distorted interests of both parties. Herr and Anderson (2014) suggested the researcher must consider his/her position within the research to ensure openness so that power relationships that exist do not lead to participants skewing the data.

In this study the worry was that pupils may feel they needed to give certain answers or just give me positive reactions to the CLP as I teach them, rather than express how they really felt. This could have been a cause of bias, so I wanted to make sure pupils did not feel pressured to take part in the study, could be open and honest in their answers and maintain the positive professional relationships I held with them. One way that I tried to ensure against these issues leading to bias was through gaining their and their parents' informed consent (section 5.4). To make this clear within the information letter, I reiterated that it was voluntary to take part in the study and it would

not affect their marks or other work by not taking part, along with detailing the intended outcomes of the research to improve my teaching and learning practice. This followed the ideas of the Cohen *et al.* (2011, p.52) that 'informed consent implies informed refusal'. It was also important to make sure for this reason that they all understood the right to withdraw from the study. As made clear by Willimen and Buckler (2010), pupils can do this at any time without penalty and it was important to repeat this point on several occasions to ensure pupils fully understood this. I did this by including it at the bottom of information and emails sent out that detailed each stage to the pupils.

Mercer's (2007) case study of insider research also offered further perspective and ideas in my research design and ethical protocol to mitigate bias. Her research described how an insider researcher held a clear understanding and good relationships with the people within that setting. She saw this as an advantage allowing her to uncover information that she believes an outsider would not have been able to. Mercer (2007) ensured that she was open and honest in the study, displaying well documented methods and data collections as Merriam (1998) suggests upholding reliability and mitigating bias.

Within her study she was able to compare insider and outsider research as she also gathered data from a second setting where she was not an insider. Mercer (2007) explained that both sets of research drew similar results that were comparable, helping to demonstrate that the insider results were not biased. However, she does raise issue with validity within the research, questioning how participants as people will interact and give different answers to different people at different times. Indeed, this is picked up by Silverman (1993), arguing that accounts are context bound so as Mercer (2007) suggests, answers may vary between participants and the interviewer. Mercer felt this demonstrated that in both settings similar data could be collected but in her opinion in

the second setting, she does not believe she was able to uncover some information that she did in the first setting due to the lack of these relationships.

Whilst good relationships between participants and researchers can be fruitful, Opie (2009) warns against manipulation, misinterpretation of information and asking leading questions that again can affect bias and validity. Cohen *et al.* (2011) call for a researcher to displaying their judgement and maintain an understanding of the professional boundaries to ensure participants can answer freely and their views be recorded truthfully.

Throughout the data gathering I followed the ideas discussed. I used online questionnaires to gather initial data, meaning I could ask pupils questions without them knowing my opinions. I made sure questions were neutral, not pointing to good or bad ideas. Taking the answers participants gave into the interviews allowed me to ask them to expand on their opinions. I made sure I did not voice concerns or show emotion when they were positive or negative about the CLP. In order to ensure that pupils were not trying to please me with their thoughts, I again did not make positive or negative comments about the CLP when using this in class. I kept coming back to the point across all the interviews that it was their own perceptions, thoughts or views that I wanted to collect.

5.3 Ethics of power relationships

Opie (2009) explores this issue of power relationships where a researcher may cause manipulation within relationships to seek the outcome or data that they desire rather than what the participant states. This can happen through the researcher asking leading questions, using their position to influence the participant, misinterpreting information they collect or making pupils/participants feel they need to answer questions in a certain manner to please the researcher. Herr and Anderson (2014) highlight the rise over the last decade of insider-based research focused around reflective practitioners seeking to develop, improve and understand their own practice. Indeed, this was the position I was in as researcher and teacher, meaning the dual role I held meant I could hold this power over the pupils I taught.

First, I wanted to ensure participants felt under no pressure to take part in the research questionnaires or interviews, making this clear through the letter (Appendix B) that I gave to all pupils and parents outlining the research. Again, informed consent and the right to withdraw during the research were a crucial step to allow pupils to feel they were not forced to take part in the research (Sections 5.4 and 5.5). Addressing the manner that questions were asked, answered and interpreted was a significant issue raised by Stake (2005), Opie (2009) and Herr and Anderson (2014) to mitigate bias. I followed Mercer's (2007) approaches by ensuring: questions were clearly explained, participants were not rushed to answer, in the interviews I did not interrupt and listened to their answers before asking further questions and ensured that participants fully understood the purpose of the research with their data being used to facilitate the study.

Opie (2009) and Herr and Anderson (2014) suggest anonymity and confidentiality are important to recognise when carrying out research with participants' data. I recognised

both in order to ensure that pupils would be confident that anything they said would not be shared and that all responses would be reported anonymously in written reports. As detailed further in sections 4.6 and 4.9, the data collected from the online questionnaires and interviews was coded to ensure both anonymity and confidentiality and stored securely as set on in section 5.6.2. Although given the setting of the research full anonymity for participants cannot be claimed as a simple web-search using the researcher's name would identify the setting, although individual respondents cannot be identified from the material. The Y12 pupils who were involved in the study will have left the school by the time the study is completed. However, I hoped, as suggested by Dawson (2009), Opie (2009) and Herr and Anderson (2014), that the approaches outlined above would allow participants to feel relaxed and confident, meaning they would be able to answer in an open and honest manner to provide data that I could then use to form fair judgements and conclusions through the analysis process.

5.4 Informed consent

Permission for this study required two sets of permission: first from the school, as this case study focused on my own practice; secondly, gaining the permission of the students (and their parents, as they were under the age of 18) and therefore who would be potential participants within the research. In order to gain the school's permission, I sent my research proposal to the headmaster, clearly outlining the research study risks, rewards and the intended outcomes of improving my own teaching. I set up a meeting to discuss the proposed research in further detail; he was supportive and gave permission for the research to be completed if it met the university's guidance and if permission were sought from pupils and their parents.

Girvan & Savage (2012) outline informed consent as the most important ethical practice. A view is shared by Derry *et al.* (2010), stating the need for participants to fully understand the purpose, potential risk and rewards involved with any research. In accordance with the BERA (2018) guidelines, a letter detailing the research project and outline was sent to parents (see appendix C). I also wanted to ensure that the students fully understood the nature of the research and their involvement would be as participants if they consented to join. I gave each a copy of the letter and explained the research and my dual role as researcher and teacher (see section 5.2). The letter highlighted that all information given would remain anonymous and confidential in the research and the subsequent write up. Once permission had been given prior to the research starting, the online questionnaire was sent out with further instructions to all those who had consented to take part.

5.5 Right to withdraw

In understanding the idea of informed consent, the researcher must appreciate the rights of the participants, including the right for them to withdraw. As set out in the BERA (2016, p.9) guidelines:

Researchers will remain sensitive and open to the possibility that participants may wish, for whatever reason and at any time, to withdraw their consent.

In order to ensure all pupils understood this basic right to withdraw, the following steps were taken:

- the information letter sent to parents and students clearly stated the right to withdraw, for whatever reason and at any time
- each stage of the research was clearly set out, organised and details were sent out in advance to participants
- the research was carried out with the aim of improving teaching practice and so there was a purpose for the research and something participants could contribute towards.

The information letter set a date of 20 May 2019 as the final deadline for the right to withdraw, as after this point it was intended for the findings of the research to have been incorporated in a first draft of the thesis.

5.6 Further ethical considerations

The use of ICT within education does require ethical consideration along with the technical issues that were discussed in Chapter 2. The CLP used in the research included a chatroom to allow for discussion and collaboration between the pupils; taking guidance from the experiences of Issroff and Scanlon (2002) and Rambe (2012), I ensured this was monitored. They found that even with tertiary students there were some issue with communication between pupils. I wanted to ensure and with an open forum, pupils did not interact in a negative or rude way that may lead to work not being completed, to bullying or even to disengagement.

5.6.1 Safeguarding

This type of issue fell within the area of safeguarding children when online; I therefore made sure I followed school policy to inform how I monitored the online behaviour of pupils and made sure they were given clear instructions how the CLP should be used. As shown by the Beat Bullying Survey (2012) which found that 28% of 11 to 16-year olds had been targeted by cyberbullying, this type of bullying is an issue and I wanted to prevent the chatroom having a negative impact on learning. The school ran a number of course through its wellbeing programmes to ensure pupils knew how to behave online and by setting out clear instructions I felt there was a clear guidance in place so that pupils knew how to communicate with the CLP to ask or answer questions or collaborate with other students in the relevant spaces. I did keep a record of the chatroom and conversations from the collaboration space in case any issues were reported, or I needed to follow up any issues.

5.6.2 Data storage and security

The Data Protection Acts of 1998 and 2003 which will be superseded by General Data Protection Regulation (GDPR) (2018) govern the access, compliance, storage and use of any personal data. This meant, as Cohen *et al.* (2011) and Girvan and Savage (2012) discuss, the privacy and confidentiality of any participant data collected must be securely stored by the researcher or institution. I ensured that any data that was collected digitally was securely stored using the school encrypted servers and a backup copy kept on a USB drive at home in my filing cabinet.

As detailed in Chapter 4, the responses to the online questionnaire were carried out on a secure website and once they had been completed these were downloaded onto encrypted servers and the questionnaire and data then removed from the website. The interviews were recorded digitally, and once recorded these were put on an encrypted server and the transcripts that were produced were stored in the same manner. If a participant wanted to withdraw, each set of data was coded to a pupil number so the associated files could have been deleted. To ensure anonymity and confidentiality, two key aspects detailed above by Dawson (2009) and Mercer (2007) and to follow BERA (2020) guidance for keeping participants' views and responses confidential the following codes were used to anonymously identify each pupil for the interview section.

Figure 5.6.2 coding information for interview process

Interview code	Meaning
PN	Participant
Y7	Year 7 pupil
Y12	Year 12 pupil
T	Teacher
1 or another number	The identity number given to that pupils' (or teachers') answers in response to the interview questions.

Therefore, PN Y7 1 – would be a Y7 pupil listed as number one in the interview transcripts. The pupils' numbers match to those in the questionnaires, so pupils in Y7 numbers 1 to 8 and Y12 numbers 1 to 7 are the same in both questionnaires and interviews. Copies of three interview transcripts, two pupils and one teacher are available in appendix E. In total 15 pupils agreed to take part in the interview process with eight from Y7, seven from Y12 along with four teachers.

5.7 Summary of Chapter Five

The ethics chapter has set out to address the following key areas of ethical consideration: gaining permission from the case school, informed consent from the participants, ensuring anonymity and confidentiality, the position of the researcher regarding insider research, power relationships and the right to withdraw. I have detailed through this chapter how I approached each from the initial proposal to completing the thesis, referring to good practice and strategies detailed in educational research. During the research, the protocol set out in this chapter was followed to ensure both the participants and researcher were protected.

Chapter Six Approach to qualitative data analysis and coding

6.1 Chapter outline

This chapter explains the uses of qualitative data analysis to analyse the data and the template analysis used to respond to the following research questions outlined in Chapter 1.

Research questions

3. What are the uses of CLP as a teaching tool in the case school?
4. Perceptions and reactions: what are users' attitudes to CLP?
5. What are the professional implications of this?

The collection of data happened in two stages as outlined in the research design in Chapter 4: first, background data was collected using online questionnaires before interviews were used at the end of the teaching (see figure 4.4a) to question participants.

The initial data collection was used in three ways as outlined in section 4.8: to collect background data, inform the interview questions and to help design the a priori themes, as outlined in section 6.6. The second stage of data collection happened using interviews. This chapter explains the process selected that was used for the data analysis of this data. The chapter begins by critiquing qualitative data analysis before explaining the choice of template analysis and then showing how data was coded and analysed using Computer Packages (now) Available to Support Qualitative Data Analysis (CAQDAS). Following this chapter, Chapters 7 and 8 displays a range of representative data and the data analysis before the conclusion are drawn in Chapter 9 going onto state the research findings.

6.2. Qualitative Data Analysis

Stake (2005, p.71) states that qualitative data analysis is ‘...a matter of giving meaning to first impressions as well as final compilations’, suggesting the researcher needs to make sense of their “observations” (data collection) to present meaning to the data.

Stake furthers his idea of the data analysis process outlining how a researcher must use their impressions and reflections to analyse their data with a chosen data analysis method. Stake (2005) suggests that there is not a single correct approach to use when analysing data, leaving the researcher free to choose how they will search for patterns and analyse these. Although using a Stakian approach in qualitative data analysis does have a couple of characteristics, first only qualitative data should be analysed, unlike a Yinian approach where both qualitative and quantitative data should be used. Secondly, the analysis of data should start and run simultaneously with the collection of the data; however, there is flexibility with this and data analysis can continue and be revisited afterwards.

Data analysis in educational research is underpinned by three principles: judgement, the workings leading to this judgement, and the interpretation formed from the judgement of the data, in drawing to a conclusion (Kara, 2016). The research and works of Braun and Clarke (2006), Joffe (2012), King (2014) and Ritchie *et al.* (2014) provided further detail and explanation around building in helping judgments and meanings from data. The writers named depict a process that involves the researcher working through data systematically identifying themes that fit into a hierarchal structure or patterns that can construct answers to the research questions. This is reflected by Ritchie *et al.*'s (2014, p3) common characteristics for qualitative data analysis, ‘...as research directed at providing or interpreting the understanding of participants’ experiences and perspectives.’

As previously stated through the selection of methodology, research design and methods in my study I hoped to collect rich qualitative data (Stake, 2005) that would describe pupils' perceptions and reactions demonstrating the barriers and benefits of the CLP. This idea was echoed by Flick (2014) and Spencer *et al.* (2014) when discussing the possible qualities and unique insight into the perceptions and views offered by the voice of the participants when using qualitative data analysis. Both Braun and Clarke's (2006) and Creswell (2007) offer similar views through their notions of qualitative data analysis where they look to beyond what they term as the surface data. This aims to find the unique words, phrases, feelings and beliefs from each participant, allowing the researcher to understand their point(s) of view in relation to the researched area.

I believe I was able to capture these personal and unique accounts in my study as presented by the data in Chapters 7 and 8; for example; Y7 pupils' ideas linking CL with cheating or copying, descriptions of how Y7 and Y12 pupils were working together using ICT outside of lessons, and Y12 pupils' beliefs of improvements to their mathematical and problem-solving skills. Using this data, I could then apply Stake's (2005) idea of applying my own impressions and reflections, asking what assumptions, conditions, implications or meanings could be drawn out of the data. Indeed, Spencer *et al.* (2014) suggest that the ultimate aims of analysis are to allow the researcher to describe, explain and theorise as to what has happened or why. Indeed, qualitative research lends itself towards the generation of new knowledge; as Gibbs (2007, pp.5) goes further stating that data analysis 'explicitly tries to generate new theory and new explanations.' I hoped that my research may be able to suggest new knowledge within the case setting around the use of the CLP, in particular its barriers and benefits.

6.3 Qualitative Data Analysis - Interpretive Phenomenological Analysis (IPA) and Thematic Analysis

The last of Kara's (2016) three principles introduced earlier stated the need for interpretation formed from the judgement of the data drawing to a conclusion. To do this the data gathered in the study needed to be analysed. Spencer *et al.* (2014) explain there is no single way to analyse data qualitatively; indeed, this literature, along with that of Creswell (2007), Flick (2014) and Ritchie *et al.*'s (2014), lists no fewer than eleven different substantive approaches. Each offers a different way of investigating the different aspects of the data gathered with the aim of trying to explain the meaning and what the data says. Through my reading and research into qualitative data analysis, two of these approaches: Interpretive Phenomenological Analysis (IPA) and Thematic Analysis stood out as possible ways of analysing the data generated.

Larkin and Thompson (2012) explained how IPA aims to give participants within a set context a way to understand experiences through the theoretical perspectives of phenomenology, hermeneutics and ideography. The theories behind IPA are heavily linked to psychological concepts, in particular hermeneutics and phenomenological epistemology which Smith *et al.* (2009) explain is theory of interpretation of people's everyday experiences. Through this idea IPA seeks to allow a researcher to try to make sense of the experiences of a participant as they explain their experiences by interpretation of how a context or intervention affected them. I felt this resonated with how I wanted participants to reflect upon their experiences using the CLP to explain to me their perceptions and reactions towards the CLP.

Thematic analysis explained by Crabtree and Miller (1999) and Braun and Clarke (2006) is a method for analysing, discovering and identifying patterns (themes) within the data gathered from research. Unlike IPA, thematic analysis is not bound within a

theoretical framework; (Joffe, 2012) and therefore Braun and Clarke (2006) explain that it has a flexibility allowing it to be used in different ways rather than being tied to an epistemological or theoretical standpoint. As Spencer *et al.* (2014) explain, the researcher probes the data to explore the patterns that exist to bring these together as themes that address the research question. As Braun and Clarke (2006, p11) explain:

‘A theme captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set.’

They go on to state that, as this is qualitative analysis, the theme does not need to occur a certain number of times, but it must bring meaning to the data allowing the research question(s) to be answered.

I chose to use thematic analysis over IPA, as it was not set in a fixed theoretical framework that allowed for flexibility that fitted with the epistemological and case study methodological approach detailed in Chapter 3.

Through their critique of thematic analysis Braun and Clarke (2006) highlight the pitfalls which are reflected by template analysis that include a lack of analysis, bias and researcher bias and linking interpretations of the data to a theoretical framework. A lack of analysis can occur if a researcher does not fully justify or link explanations of data to the suggested themes, meaning the themes are not supported. This also can occur if the researcher is trying to link a theme to a theoretical framework, without there being data to justify this supporting evidence. King (2014) picks up on the idea of bias or researcher bias arguing the researcher needs to be clear with their approach as they have set out themes, but must be able to prove their existence rather than just say they exist. I hoped by using a clear set of themes and framework that I would be able to mitigate bias and a lack of analysis in this research.

6.4 Strengths and challenges of template analysis

Entering the research in the dual role of researcher and teacher I held some views that may have affected the research or judgements made. These preconceptions arose due to my background and the environment I was teaching in through trying to innovate in line with the school's ACP. In researching thematic analysis, a variation arose called template analysis which seeks to assist the analysis by the researcher to identify and then look for themes that occur through the research. Template analysis is built on the ideas of thematic analysis used by Crabtree and Miller (1999) seeking to allow the researcher to interpret and analyse qualitative data. The major difference is that the researcher uses preconceived themes referred to as 'a priori' (King, 2012), that is the themes are defined in advanced of the research as a lens through which the research can be analysed. I felt the use of the a priori themes fitted well with my background, as I mentioned coming into the research holding some preconceptions of areas I would be looking for in the data. Again, reflecting on the ideas of bias and insider research, declaring these themes ensured that I was being open and honest with reader.

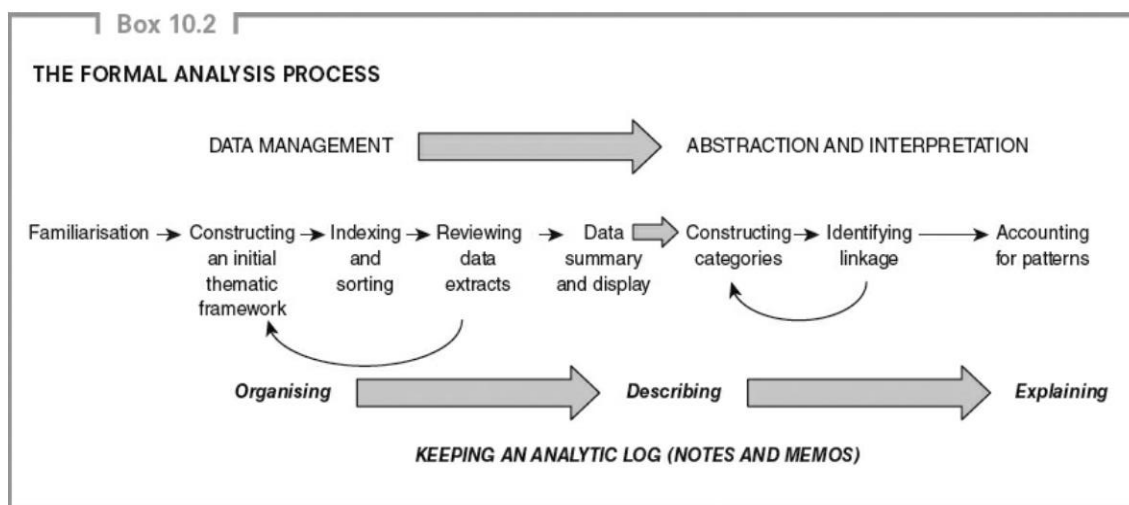
Crabtree and Miller (1999) suggest that thematic analysis has a set number of themes that are fixed within a hierarchical level; the main themes are split into subdivisions which Braun and Clarke's (2006) generic thematic analysis approach demonstrates. These are seen in three fixed levels and a hierarchical structure, which are then set out as descriptive codes, interpretive codes and then overarching themes. King (2014) argues that this structure referred to by Braun and Clarke (2006) and Joffe (2012) can be too rigid, as the set themes do not afford the flexibility the researcher may require. This can be required in order to fit or relate the template to the data or expand the template during research with new emergent themes. King (2014) explains that

template analysis offers more flexibility allowing the themes to be changed or refined during the research that can consider emergent themes that may not be initially identified.

I was drawn to this as a novice researcher as I believed that although I did have an idea of the initial themes I would use, I felt data could lead me in a different direction. As set out through the research design, the use of the online questionnaire was to help inform the interview questions and so during the research it would be likely that there were emergent data and that themes may need to be redefined. However, King (2014) does warn the researcher not to get lost by continually trying to redefine the template in pursuit of trying to find the perfect template. King's (2014) offers a test for this by ensuring that the template allows the reader to see what is being investigated in the study rather than all the data collected being presented.

6.5 Applying template qualitative data analysis using the formal analysis process

I decided to use the formal analysis process (figure 6.5a) proposed by Spencer et al. (2014) to add a framework and clear steps to my analysis process, ensuring I did not miss out any parts of the data analysis process. A key part of the model described by Spencer et al. (2014) is the non-linear nature ensuring that through the analysis the researcher can return to previous data and themes to test these again. Indeed, this reflected the ideas within template analysis of testing the a priori themes to modify or redefine, as discussed in the following sections. I hoped this would also guard against Gibbs' (2007) description of how novice researchers often halt their work after having identified what is happening.

Figure 6.5a The formal analysis process model (Spencer *et al.* 2014, p.280)

As previously identified, I was keen to explore the rich unique statements that qualitative data could deliver. My aim was to be able to analyse these in a way that allowed me to follow Roller and Lavrakas's (2017) description of the researcher moving beyond just the description of the data. They state that if a researcher can achieve abstraction and interpretation through the process (Figure 6.5a), then the researcher can begin to account for patterns in the data, gain explanations from the data and demonstrate the linkage between the data.

6.6 Preconceptions leading to the initial ideas of the a priori themes

To design a priori themes Brooks and King (2014) explain that researchers should use themes reflecting areas of interest, key phenomena and ideas that would allow assistance in answering their research question(s). I linked this to my background and how the school's policy informed the research as I aimed to adopt an innovative approach to teaching. Indeed, King (2014) states template analysis sets out that there is not a set number of themes or areas to investigate, so I did not try and produce a certain number of themes and subthemes. To produce the initial a priori themes I first

considered the background stated above along with how the research was focused on the uses of the CLP and innovation.

I then thought if asked questions about these two areas, how pupils would respond or what would then mention. I then considered research questions 3, 4 and 5 as I would need questions in the interview that would enable data collected to in turn answer these. Finally, by bringing these ideas together I arrived with the three higher-level themes of CL, Innovation in learning and CLP. Further reading around the model Braun and Clarke (2006) describe for thematic analysis, Silverman's (2000) research and King's (2014) explanation of template analysis introduced, directed me towards how the hierarchy of themes worked, meaning that I needed to subdivide these overarching areas of interest into sub-themes that would contain ideas that built up to the higher-level themes. Figure 6.6a displays the sub-themes that I selected based on my understanding of the preconceived higher-level themes, for example I initially divided CL into three areas: working in a group, learning and sharing knowledge. I did this as I believed these would be the areas that the pupils' responses would mention that would build up data that discussed the higher-level theme of CL.

Figure 6.6a – Initial a priori themes and subthemes

Higher level Theme	Collaborative Learning	Innovation in Learning	Collaborative Learning Platforms
Sub Themes	Working in a group	Using IT	Preconceptions
	Learning	Discussions using IT	What should they contain
	Sharing knowledge		

6.7 An introduction and outline of thematic coding used in the research

Having identified the initial a priori themes, King (2014) states these need to be tested in a way which allows for the process that Brooks *et al.* (2013), discuss enabling themes to be refined. The first step in this process was to become familiar with the data, which I did by looking through the online questionnaire responses and using a spreadsheet and Word document to help sort them prior to coding.

My understanding of coding was built on Silverman's (2000, pp.377) definition of coding as 'Putting data into theoretically defined categories in order to analyse it.' Gibbs (2007) goes on to explain that this involves bringing together data that 'exemplify the same theoretical or descriptive idea' (Gibbs, 2007, p 38). This process allows the researcher to identify, label or signpost data that they find of interest through this initial phase, before it is then sorted and interrogated into key themes (Spencer *et al.*, 2014) through analysis to enforce theory or generate new knowledge.

In the explanation behind the use of template analysis above I have outlined how my background in teaching and the research questions gave me predefined categories/themes that I was looking to investigate. Using this definition along with Gibbs (2007) and King's (2012) explanations that through the coding process a researcher identifies words or phrases from the text to link that data to the research (research questions) or to other data, gave me a starting point. Silverman's (2000) examples, Frith and Gleeson's (2004) and Braun and Clarke's (2006) research presented how researchers had carried out the process Gibbs explained.

An example of this coding process from my research is given using the following Y7 and Y12 pupils' responses to being asked to explain what CL was.

Y7 PN 3 – 'Work together may be copy work.'

Y12 PN 22 – ‘Learning as a group both giving out and receiving knowledge from or to others and making new knowledge.’

First, the data was transcribed into Quirkos (section 6.9) where I checked the transcription as part of the familiarisation process. I then applied my code in the form of the a priori themes (section 6.6). This response explained CL meaning that the data was in the CL higher level theme. I then used Gibbs’ (2007) ideas to review the language and text to see whether these matched any of the sub-themes. The Y7 response had data that matched two sub-themes (categories) and the Y12 response matched three subthemes. The coded data is demonstrated in figure 4.3 below showing how it was sorted using the coding process, which meant data could be easily compared and analysed in Chapters 7 and 8.

Figure 6.7a Outlining the coding process

Theme		Participants responses	
Higher level Theme	Collaborative Learning	Number 3	Number 22
Sub-Themes	Working in a group	‘Working as a team’	‘Learning as a group’
	Learning	-	‘giving out and receiving knowledge from or to others and making new knowledge’
	Sharing knowledge	‘copying each other’	‘giving out and receiving knowledge from or to others and making new knowledge’

Following the guidance given by Braun and Clarke’s (2006) thematic analysis design I have used the coding to sort the words/phrases from the responses into

categories/sub-themes. This was done so that in analysis these can be used to extract description or be interpreted to allowing data to support the research questions or link to other data from participants. The process outlined above enabled me to coding based around the themes relating to the education setting, school policy, my teaching pedagogy, pre-existing relationships and school environment within my research. This demonstrated the approach King (2012) explains as template analysis, a style of thematic analysis designed around a template or themes linked to the research setting to be used to allow analysis with these themes.

Kara (2016) criticises the idea of pre-defined as she feels it narrows the research scope and could lead to the misrepresentation of data or wrong conclusions being drawn. However, King (2014) argues by acknowledging the themes and making them clear it allows for open and honest research through this method. In fact, he goes on to suggest that it is almost impossible for a researcher to approach a study with no preconceptions, again linking to the area of researcher bias that is outlined in section 5.2. Additionally, as Gibbs (2007) and Spencer *et al.* (2014) suggest in the coding process, the researcher should revisit the data to see if themes continue to emerge or new themes or sub-themes become apparent. I did this and made sure after the initial coding the a priori themes (figure 6.6a) were revisited and refined as explained in section 6.10.1 and 6.10.2 ready to be used for analysing the interview responses.

6.8 Coding with data analysis software

Coding can be done in several ways that bring different benefits and challenges; as Merriam and Tisdell (2015) identify, these can range from simply sitting down with transcripts and a highlighter, working through the data line by line or by using computational software packages. Initially, I had planned to use a simple highlighting method on transcripts but quickly found that with the number of questionnaire responses and the fact they were completed online, computation software would be beneficial. These software packages are referred to as Computer Packages (now) Available to Support Qualitative Data Analysis (CAQDAS).

Studies by Burgess (1998), Lewins and Silver (2007), Seale (2011) and Merriam and Tisdell (2015) assess and compare the CAQDAS available to researchers; they flag different benefits and issues related to the softwares and the usability. For example, data management features are explored in detail; the benefits of these over manual transcription are suggested as secure data store in one place, the possibility to develop analytical structures that can be applied to a large range of text at once, and functionality to code segments quickly. All do agree that CAQDAS can assist a researcher with data management, interpretation and project management whilst individual programs can also offer further features.

When considering Gibbs (2007) and King's (2014) arguments about the limitations of thematic research they suggest that the time required for refinement, the consistency or errors in applying a template and - if refinements are made - the time to reapply the template, are issues that can impact on research. In fact, CAQDAS can help to mitigate these issues. Lewins and Silver (2007) highlight how researchers can reorganise data quickly with keyword or phrase searches and the fact that codes/themes can be changed before being quickly reapplied to all the data. (Flick, 2009) describes how the

interpretation functions can be used to help analyse data, allowing improvements in accuracy, consistency and rigour by ensuring all the data has been used. Seale (2010) adds that a further benefit is that the software can be used to demonstrate that the researcher has searched data for negative instances or instances that may be contrary to your judgements. This once again helps to avoid bias or the idea that only selected themes that would demonstrate certain ideas were investigated. I used the suggested approaches above and these helped with moving between responses and through comparative data analysis of questions and the coding process outlined in section 6.7. I also found, as explained in the next section and demonstrated in Appendix F, that the Quirkos software I used had features that allowed storage of notes, and the production of mind maps that helped to display the ideas interlinking data that allowed me to me to visualise the data analysis process.

Although I have discussed the benefits of CAQDAS, the data analysis process can be completed as Kara (2016) suggests in a more traditional way without computers and equally there are issues with using CAQDAS. Weitzman (2011) stresses that the speed and power of the software can lead to researchers not fully analysing or coding data, for example they may miss areas or by working quickly not pay full attention to potential areas of interest. Likewise, Coffey and Atkinson (1996) raise concerns about the ability to perform certain types of text analysis due to the layout and possible limitation of the software. It can also be problematic loading data transcripts into the software and a large amount of time may be required to train and effectively use the software. They also felt that with larger sections of data it is not possible to see all the data, and some can become unclear due to the program; this could therefore impact thematic analysis or discourse when investigating how the language is constructed.

Despite these points, Lewins and Silver's (2007) study clearly shows the benefits of using CAQDAS; after trailing different packages I selected to use Quirkos. In my opinion this was the most reliable, offered several different options that could be used in analysis, and was the easiest to use due to its interface. Further functionality included the ability to import the transcripts of interviews and questionnaires reliably and in a single step to ensure all data was transferred in one instance. Kara (2016) make a final significant point: that it must be remembered that CAQDAS packages cannot replace the crucial role of the researcher in the analytical process.

6.9 An overview of coding with Quirkos

Appendix F contains Figures F1, F2 and F3 that are screen shots of coding and data analysis from Quirkos that display the user interface of Quirkos during different stages of coding. These images present a brief overview of Quirkos, its features, layout and how I was able to use it during the coding process. I used Quirkos to analyse the data as set out earlier in this section; following the formal analysis process (section 6.5), this started by applying the initial template (Figure 6.6) as explained in section 6.7.

The data was coded and using the visual interface was then displayed through Quirkos to allow analysis based around the language and text used. This can be seen in Appendix F with the coloured dots in the centre of the screen being the a priori themes as mentioned above: blue CL, pink CLP and purple Innovation in learning. Figures F2 and F3 demonstrate Quirkos being used during coding an interview transcript later in the analysis process. Here the themes and sub-themes are represented by the coloured bubbles, as explained. The right-hand side of the screen displays the participant's interview transcript. As I worked through the transcript I used the different codes to highlight phrases, sentences or words as explained in section 6.7.

6.10 Data analysis steps used in the study and refining the template and a priori themes

6.10.1 Refining the a priori themes

Data analysis began with the online questionnaires. As these were being completed, the first step of the formal analysis process (figure 6.5a), familiarisation began. Through this process I aimed to become familiar with the responses of pupils, going over these looking at the answers given to allow myself time to think about what they had written and possible patterns. The next step was to test the template made up of the initial a priori themes and sub-themes that I had drawn up (figure 6.6a). I did this by applying the coding and text analysis to the online questionnaire responses; I coded and compared answers setting them out in Quirkos and analysed between participant responses and the questions. Figure 6.10.1b below demonstrates how data could then be arranged via the data sub-themes as was carried out in the data analysis processes. An advantage of using the questions was the ability to test the a priori themes with a substantial amount of data and refine these before a second refinement at the beginning of the analysis of the interviews.

Figure 6.10.1b Data table to show Y7 responses to Q3.

High level theme CL	Q3. What do you think the term collaborative learning means? Participants responses by number			
Sub-level theme	2	7	11	17
Working in a group	Together as one team	Working with other people	working together as a team	Working together
Learning				
Sharing knowledge	Cheat		Copy work may be cheating	

During this first analysis stage there is the possibility to review and test the template that has been designed; this was done to see whether the themes and sub-themes were present in the data. However, I also found that there were emergent sub-themes that I had not considered during the design process. For example, within the area CL the data demonstrated two such areas around cheating and CL, and varied levels of pupils' confidence in using ICT. The emergence of these new sub-themes raised new lines of inquiry that I followed up on in the interview process but also used to update the template.

The template was refined using the new sub-themes mentioned above but also to incorporate two new themes: innovation in learning and professional implications. These themes were added as data from the pupils on CL and the use of ICT ideas of how teachers used or would use these was going to affect the use of a CLP. I would also explore both areas when questioning the teachers in the interviews. Figure 6.10.1a in Appendix G displays the redefined a priori themes for testing on the interview data. The new coding template was established prior to the interview process to make sure the higher level and sub-level themes were clear and transparent before data gathering began again following the guidance of King (2014).

6.10.2 The final a priori themes

Data was collected from the interviews with the pupils and teachers, as set out in Chapter 4; again following the formal analysis process, familiarisation was conducted which was aided here as I transcribed the interviews from the audio recordings.

Following, Gibbs (2007) and Spencer *et al.*'s (2016) suggestions, I then reviewed and tested the refined initial interview a priori themes (Figure 6.10.1a, Appendix G) using five of the seventeen transcripts in the same way as I did in above with the initial a priori themes. Both sets of research recommend this as a way to test the template and ensure that the data does reflect the themes and sub-themes so analysis can be completed. This enabled reflection and review of the data, along with a way to check that the template would allow for full analysis.

From the data I found there were two areas that continually came up which I decided to make higher level themes; these were the confidence of pupils and language used by pupils or teachers. Both were areas that arose when revisiting the questionnaire data alongside the interview data, as I could see how the language used between the years was so different and the changing levels of confidence. Figure 6.10.2a below displays the final a priori themes that can also be found in Appendix G. The final stage of refining the template was to then reapply this to the five sets of transcribed data that had been coded and sorted. Through this analysis I was able to test these themes and found that data that matched them was common across the transcripts initially reviewed.

Figure 6.10.2a the final a priori themes.

Higher level Themes	Sub-themes					
CL	Working in a group	Learning	Sharing knowledge & social interaction/communication	Cheating	Confidence	Positives/Negatives of CL
Using ICT/technology in learning	Uses	WhatsApp/Facebook/ Social media	Collaboration	Positives/Negatives		
Innovation in learning	Learning	ICT/Technology				
CLP	Preconceptions	Reactions	Contents	Aided/Benefitted learning		
Professional implications	Teaching and learning	Improvements	Changes			
Confidence of pupils	Positive factors	Negative factors				
Language	Basic	Complex explanations	Positive	Negative		

Following this, I then began to work through the interview transcripts using Quirkos, building sets of data in the themes and sub-themes that are then analysed (In Chapters 7 and 8. The qualitative analysis process follows the steps explained by Spencer *et al.* (2014), using abstraction and interpretation which led to the linkage between data in the subthemes that in turn enabled the data patterns to be accounted for. Through this process I also listed the emerging themes in a diary to keep track of ideas, keywords, phrases, and thoughts that emerged from the data.

Angrosion (2007), recommends that the researcher reflect through the process and keep a track of areas of interest that may inform the analysis. He also states that this helps to leave an audit trail of the work done in the analysis process that the researcher can come back to or use to display how they arrived at the judgements and conclusions. The ideas were continually reviewed to examine common themes or links between each set of participant responses. This is where Quirkos then proved useful in data analysis, where the interface allowed visual identification of data sets, coding and reviewing coded data.

6.11 Presenting the data – how to display data from the study

As detailed through this chapter, sorting and coding processes were completed prior to analysis (section 6.5) - a crucial step that Gibbs (2007) suggests allows the researcher to become familiar with the data collected. As I began to work through the data, I considered the way that I wanted to display the data that would assist with the analysis but also enable readers to access the findings. I found my experience and hesitation matched what I had read in the literature examples of research from Silverman (2000), Braun and Clarke (2006) and Brooks and King (2014) around how to select the data to display and the best ways to display it.

These works suggested - and I had seen in other researcher's work - data commonly displayed in data tables, quotations and sometimes visually in charts. Spencer *et al.*'s (2016) explanation of how essential it is to display written evidence as quotations during qualitative research resonated and I paid attention to Morrow (2005) who discusses the balance between displaying key data but not drowning the research through the overuse of quotes or tables. Roller and Lavrakas (2017) gave examples by way of using short concise extracts that they state can add credibility and transparency to the research, along with the idea that this gives a unique insight through the participants' voice that Creswell (2007) states qualitative data should contain.

As I started to design data tables during the indexing and sorting process, I fell into a trap that Spencer *et al.* (2014) explain researchers within the field of qualitative data analysis often do. This is the numeration of data where the researcher can turn statements, quotations, or other qualitative data into numbers in tables. The mistake of numerating this data meant the key descriptive nature of the qualitative data was lost and replaced by numbers and percentages. A key consideration of a Stakian approach to case study was that he only advocates the use of qualitative data. I wanted to ensure I made the most of any rich qualitative data to help display pupils' perceptions and reactions, but as Spencer *et al.* (2014) explain, there may need to be some numeration of this, for example to investigate frequency of quotations or the number of a sample stating an idea. Spencer *et al.* (2014, p. 379) suggest care is needed here, as mixing numbers and quotes can lead to confusion, especially if terms such as 'a certain number of people said, or a few thoughts that, or the majority said' are used. To mitigate this, they recommend the data needs to be clearly laid out with evidence to link this to the data and what it is saying or how it is interpreted within the

study or a wider context to give it meaning and set out the importance of this data. Although I have used all the data in the research, I displayed specific examples as set out in section 7.2 in line with the suggestions from Morrow (2005), Gibbs (2007) and Roller and Lavrakas (2017) to fairly represent the data collected but not to overwhelm the reader. I have included in Appendices D, E and G copies of interviews and questionnaire transcripts along with screen shots from coding in Quirkos.

6.12 Summary of Chapter Six

Through this chapter I have sought to review the uses of the qualitative data analysis, including the selection of the analysis based on a Stakian approach within case study and how this led to my choice of template analysis based on thematic analysis. I have set out the formal analysis process that was used as a framework to enable the data analysis to move through the stages of organising to describing and crucially reaching the explaining stage that can be seen through Chapters 7 and 8. Chapter 7 focuses on the data gathered and analysed from the online questionnaire before the interview data is investigated through Chapter 8. The use of the template and a-priori higher-level themes and sub-themes is demonstrated in both chapters incorporating details to describe the findings and explanations linking the data back to the research questions.

Chapter Seven: Data analysis online questionnaire

7.1 Chapter outline

As explained through Chapter six, this research used qualitative data analysis within a Stakian approach to case study that combined ideas of thematic analysis from Braun and Clarke (2006), and Joffe (2012) with Brookes and King's (2012) and King's (2014) ideas of template analysis. This approach followed the steps set out by Spencer *et al.*'s (2016, p.280) formal analysis process model (Figure 6.5a) to provide a framework for data collection, interpretation and analysis. Through this chapter the data collected from the online questionnaires is presented and analysed that provided a background of the pupils involved, and was used to test and redefine the a priori themes and inform the design of the interviews. Each section of the chapter works through an outlined area forming key emergent themes that are then summarised in section 7.3. The aim of the analysis is to present findings towards answering the research questions three, four and five as outlined below.

Research Questions:

3. What are the uses of CLP as a teaching tool in the case school?
4. Perceptions and reactions: what are users' attitudes to CLP?
5. What are the professional implications of this?

7.2 Analysing the data – Online questionnaire

7.2.1 Introduction to analysing the online questionnaire responses

As outlined in Chapter 4, the online questionnaire (Appendix D) was designed to collect the initial perceptions and reactions from the pupils in response to the study to provide background data. Following the sorting and coding process using Quirkos described in Chapter 6, the data was grouped by the three initial higher-level a priori themes set out in figure 6.6a below so that it could be analysed. The data analysis from the online questionnaire is reported through this chapter with a summary and key emergent theme drawn (Sections 7.3 and 7.4) before the analysis of the interviews in Chapter 8. During this process, the online questionnaire also enabled the initial a priori themes to be refined as detailed in section 6.10.1 and it was used to inform the design of the interviews as explained in section 4.8.

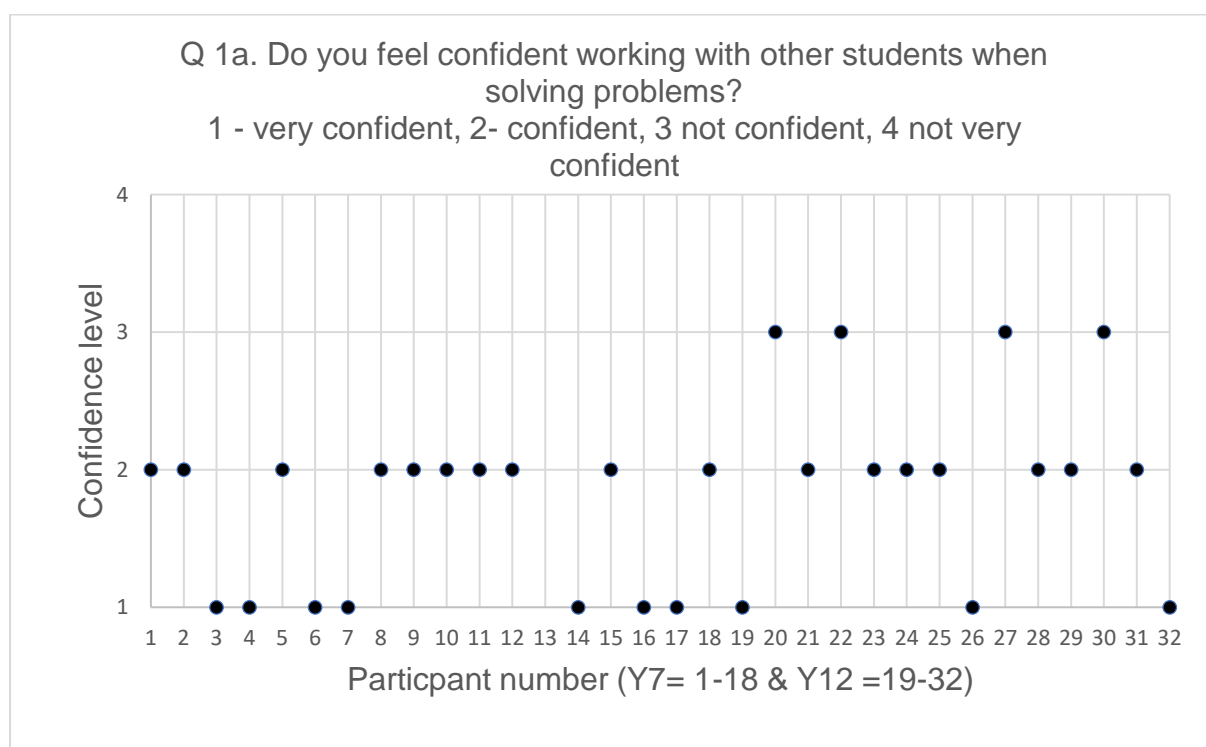
Figure 6.6a – Initial a priori higher-level themes and sub-themes

Higher level Theme	Collaborative Learning	Innovation in learning with ICT	Collaborative Learning Platforms
Sub Themes	Working in a group	Using ICT	Content
	Learning	Using ICT for work	
	Sharing knowledge		

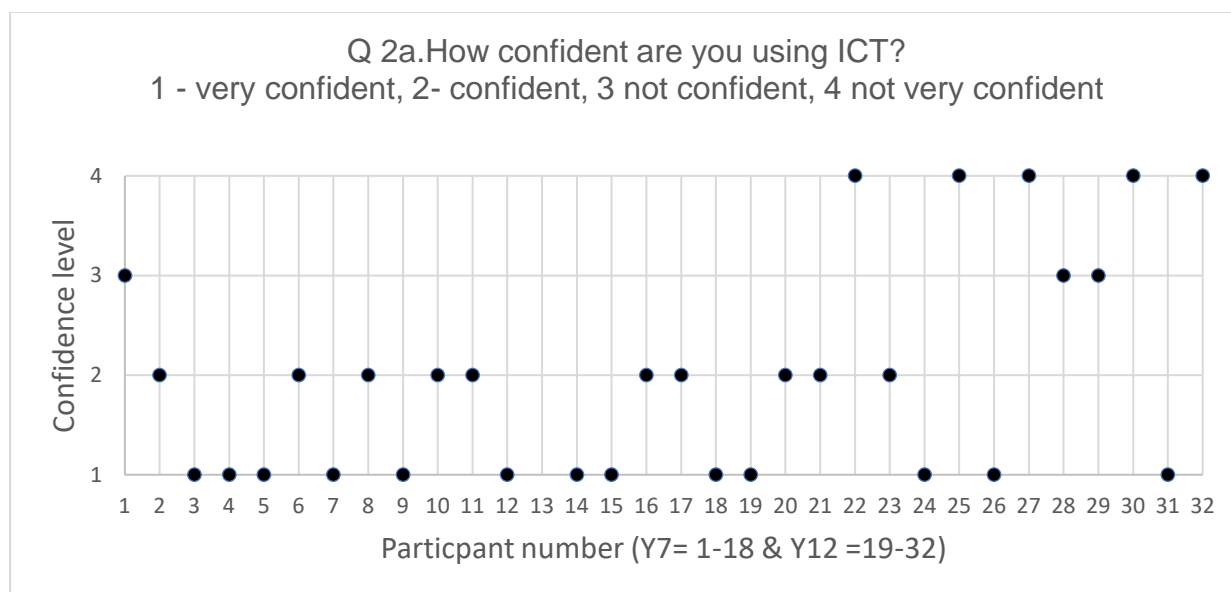
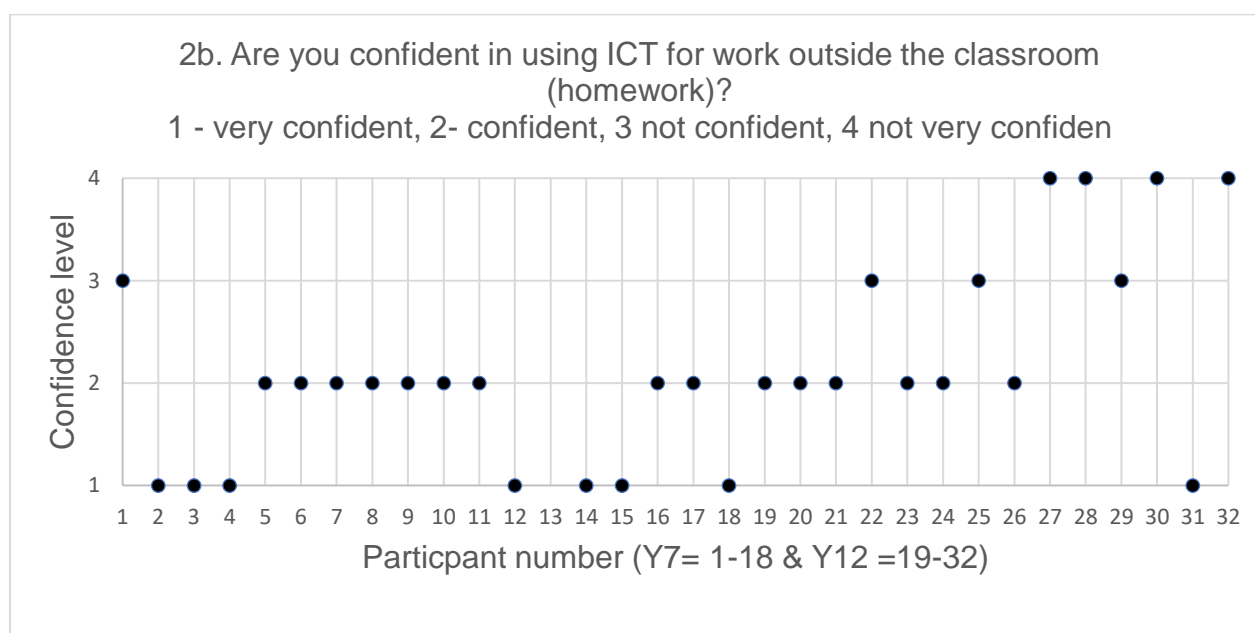
7.2.2 Analysing the responses - background and confidence in CL and ICT

I grouped the analysis of questions one and two together as they investigated the pupils' background and confidence with regard to using ICT and CL. Both questions had multiple parts and used Likert scales that offered interesting analysis when Y7 and Y12 responses were compared. The parts of question one sought to establish pupils' confidence in working with each other and investigate whether pupils did already work together regularly, whilst question two investigated whether pupils were confident using ICT and whether or how they could use ICT to aid their work.

Figure 7.2.2a – Pupils' responses to question 1a.



The data in figure 7.2.2a above suggested that there were mixed levels of confidence across the two-year groups and within each year group. This was backed up by the pupils' answers to the other questions including questions 2a and 2b (Figure 7.2.2b and 7.2.2c) that again demonstrated a range of confidences.

Figure 7.2.2b – Pupils' responses to question 2a.**Figure 7.2.2c – Pupils' responses to question 2b.**

The emergent patterns across the parts of questions one and two suggested Y7 pupils demonstrated higher levels of confidence when compared to Y12 which I had not anticipated. I had expected that the Y12 learning experience over five years at school

compared to the Y7 term at school would have meant they would have been more confident working together and indeed in using ICT. I hoped that the written answers that pupils gave would help to offer explanations of the trends. Question 1e (Figure 7.2.2d) was an example of this, following up on working in a group asking about possible embarrassment.

Figure 7.2.2d – Six pupils’ responses to question 1e.

Q 1e. Do you feel embarrassed when you have to work as a part of a group?		
PN	Answer (Yes/No)	Participants’ explanation (if given)
Y7 16	No	Working as a group is sometimes necessary to complete a task.
Y7 17	No	I feel more comfortable working in a group, and like talking through the problems.
Y7 18	No	I like working in groups.
Y12 18	Yes	I feel embarrassed if I get something wrong.
Y12 20	Yes	It’s embarrassing when you get something wrong and it’s really nerve racking as well. Peer pressure begins to build.
Y12 21	No	I enjoy working in groups and sharing my opinion and helping friends with their understandings.

The answers in figure 7.2.2d were representative of those given across both year groups. None of the Y7 pupils stated they felt embarrassed working as part of a group, whereas five of the fourteen Y12 did. This did fit the pattern of data relating to confidence displayed when compared to figure 7.2.2a; however, these answers left me with questions. I wondered whether the Y12 pupils were just more honest or felt that they could express themselves, and whether this was how the Y7 pupils really felt or if they did not want to admit their true feelings. The frustration I felt echoed the issues Opie (2009) raised (section 4.6.2) that questionnaires could not always answer

the question 'why' or allow researcher to fill all the gaps. I did not want to begin a psychological investigation, but I was glad I had the interviews to follow up on these areas to see whether I could gain a better understanding of pupils' confidence.

Regarding the difference in confidence reported using ICT, reflecting on the school's ACP helped to explain why the Y7 confidence was possibly higher than the Y12 (Figure 7.3.2c). The Y7 pupils all had individual tablet devices with their curriculum designed to use these in lessons, whereas the Y12 did not but had a more traditional curriculum. However, as the Y12 pupils had moved through the school and possibly gained digital skills, it was a real focus of the Y7 curriculum to develop these digital skills that would help to explain the differences in confidence.

Question 1d, which asked whether pupils regularly use ICT in lessons, demonstrated this policy with all Y7 pupils replying 'yes', whereas the Y12 pupils were equally split between 'yes' and 'no', highlighting the difference in curriculums. An interesting remark came from Y12 PN 20 who stated: 'Teachers find computers a hassle as we never do use them or an IT room.'. This statement raises a concern that pupils may not get opportunities to develop ICT skills as set out in the ACP if teachers did react in this way. The interviews would allow this to be followed up when interviewing both pupils and teachers to see whether they did consider using innovative approaches and what their reasoning was.

In the answers to previous questions Y7 and Y12 pupils had explained how they worked together and indeed that they did use some forms of ICT to assist with CL. I was interested as I had heard pupils using ICT and social media to work together so asked question 1f (Figure 7.2.2e).

Figure 7.2.2e – Four pupils’ response to question 1f

Q 1f. Do you/your class have a WhatsApp or Facebook or email group for any of your subjects? If yes, which ones? And what do you discuss about work?		
PN	Answer (yes/no)	Pupils’ explanation (if given)
Y7 6	Yes	If anyone doesn’t understand a question, they will ask on the chat
Y7 7	No	
Y7 11	No	I don’t use any of these
Y12 22	Yes	I message to ask friends for help with prep or the answers
Y12 23	Yes	In physics and Maths, we have a WhatsApp chat group and share ideas and questions and answers.
Y12 29	Yes	We have a group for our classes and help each other or if someone is stuck they ask how to work out the answer.

Only five Y7 pupils stated that they had or used some ICT to communicate or share work, interestingly twelve of the eighteen Y12 stated they used at least one form of ICT to communicate about work. The follow up answers were revealing as in figure 7.2.2e where they explained how they did work together and there were mentions of copying by passing on the answers. This was an area I was interested in as part of the aim of the CLP was to allow CL through the use of ICT. This is followed up in the next section (7.3.2) before further investigation into the use of social media in the interviews.

Key emerging findings:

- Higher-level and sub-level a priori themes seen in data detailing CL
- Variance in the levels of confidence across Y7 and Y12 in relation to CL and ICT
- Evidence of CL and ICT being used to share work away from the classroom

7.2.3 Analysing the responses – Collaborative Learning

Questions three, four, five and six focused on establishing what pupils' perceptions of CL were, whether pupils could explain the process, whether they used CL or if there were any barriers to them using CL. To analyse these questions, I combined the ideas from Lewins and Silverman's (2007) basic text analysis with the literature from section 6.2 including Roller and Lawrence (2017) to build an understanding from what the pupils stated in the data. The responses given to questions three (Figures 7.2.3a and 7.2.3b) demonstrated the different understandings that the Y7 and Y12 pupils had in what they believed CL to be.

Figure 7.2.3a – Six pupils' responses to question 3 from Y12 pupils

PN	Q3. What do you think the term collaborative learning means?
19	Learning with my fellow pupils by sharing information and helping each other
20	Learning with other peers and putting together everyone's perspectives and findings
21	Working in groups to share ideas and learn to help each other
22	Learning as a group both giving out and receiving knowledge from or to others and making new knowledge.
27	We can all contribute our own ideas and summarise them. So that we share ideas and share our understanding.
32	You are able to collate ideas and learn collaboratively going through answers with each other.

The responses in figure 7.2.3a were representative of the Y12 pupils using the a priori themes and text analysis. It was clear their explanations offered depth and detail suggesting that Y12 pupils had a sound understanding of CL. Y12 PN 27 and 32 responses (Figure 7.2.3a) helped to demonstrate this as they included the ideas of

sharing knowledge and working together to achieve a goal. The majority of the Y12 responses reflected the explanations and key terms used in literature of Panitz (1999), Gokhale (1995), Chuang (2004) and Laal and Ghodsi (2012) that described and defined CL.

In comparison with the Y12 responses, the Y7 explanations of CL did not contain concise explanations using words or phrases from the CL literature (Figure 7.2.3b). My initial thoughts about their responses were that some Y7 pupils had a vague understanding of the concept of CL through responses stating they should work together, whereas others had no idea at all. I was interested as a number of responses introduced the idea that CL was copying or cheating.

Figure 7.2.3b – Six pupils ‘responses to question 3 from Y7 pupils.

PN	Q3. What do you think the term collaborative learning means?
1	To work together to learn
2	Together as one team. Cheat.
3	Work together may be copy work.
4	We learn more with others.
8	They can help me, and I can help them
10	Well because if you don't get it you can always ask them. And you can copy each other

The responses above did not give the same idea of sharing knowledge or helping towards a common goal; instead, they focused on just quickly helping or even copying one another. I appreciated they had not been at the school long and so compared with the Y12 they had not had time to possibly develop an understanding of CL. Basic text analysis drew my attention to seven of the eighteen Y7 pupils using the ideas of cheating or copying in their responses to explain CL; for example, Y7 pupil 3 stated

that CL was 'Work together may be copy work'. It was clear from this statement and others (Figure 7.2.3b) that several of the Y7 pupils believed working together amounted to copying or cheating which was mentioned by Y7 pupils in answers to later questions. The idea of copying was not replicated in the Y12 data or in the literature on CL that I had reviewed as part of the literature review in section 2.5.

The data from pupils answering questions four and five (Figure 7.2.3c and 7.2.3d) echoed the explanations above, again demonstrating the differences in the understandings of Y7 and Y12 pupils. The themes that emerged from these answers again suggested Y12 could explain how to work together in a collaborative manner, whereas the Y7 pupils still held an underlying idea of just copying or handing over an answer.

Figure 7.2.3c – Four pupils' responses to question 4

PN	Q4. How do you think students can work together in a group in order to understand a topic?
Y7 3	They could share work and give each other the answers to questions.
Y7 8	By discussing ideas and working through problems together. May be share some answers or copy.
Y12 23	By covering different aspects of the topic and explaining them to each other.
Y12 24	They might need to explain something to another individual in the group which deepens their understanding. Someone in the group might also point out some misinterpretation about some of the key points.

Figure 7.2.3d – Four pupils’ responses to question 5

PN	Q5. How does working with fellow students in a group via conversations enable you to learn?
Y7 12	My friends and I, share information and learn from each other’s knowledge.
Y7 15	Means I can chat to them and see if they know the answers.
Y12 26	We can all contribute our own ideas and summarise them. We do use WhatsApp sometimes to do this if we are not near each other.
Y12 28	It allows us to discuss any ideas or work through a problem. We can then see if one of us can answer it or work it out by contributing ideas.

Y12 PN 26 answers was an example of a couple of Y12 pupils who mentioned how they used ICT to be able to communicate with others when not there in person. This linked the ideas from questions four and five back to question 1f. I followed this up with further reading and research (section 2.6.6) into the collaboration/cheating dichotomy that existed though the links between CL and the use of ICT (Goldstein, 2014). Goldstein (2014) highlights the concerns over how easily pupils could share work using ICT and social media, whilst Holub (2008) questions whether ICT and social media could play a part in CL without pupils simply sharing answers. I had experienced pupils using messaging to share work in my own teaching practice and so this was an area I followed up in the interviews. As previously mentioned, part of the CLP was designed facility CL and so this might possibly be able to investigate Holub’s (2008) question as to whether ICT could be used to allow CL.

Question six sought to examine whether there were any barriers to pupils working collaboratively, as through the literature review I found reasons that prevent pupils from wanting to work with others using CL.

Figure 7.2.3e – Four pupils' responses to question 6

PN	Q6. What could prevent you from collaborating with your peers when learning?
Y7 14	Feeling awkward if you are not too familiar with them personally or do not know anything and distractions.
Y7 15	Getting distracted, especially if conversations start about unrelated topics.
Y12 29	Attitude of other student and not sure if I have the correct understanding to share or anxious about getting the answer correct.
Y12 30	Disputes about social problems outside the classroom and distractions. But also, potentially getting the answer wrong or telling them the wrong thing.

Both year groups gave similar responses that focused on two areas, as explained in figure 7.2.3e. These were distractions or the negative influences of others and anxiety over making a mistake. Negative influence of other group members was a common theme in literature where others in the group would distract by arguing, talking or indulging in silly behaviour that could prevent work from taking place. Rutherford *et al.* (2010) and Lee *et al.* (2014) explained how this could arise from social issues between learners that led to distractions or work not being completed, reflecting the perceptions in the pupils' answers.

Rutherford *et al.* (2010) also highlighted the issue of anxiety when pupils had to work with others in a group, especially when pupils worried about making mistakes. The data collected demonstrated that Y7 and Y12 pupils were concerned by this and that it was reflected in some of their answers to question 1e (Figure 7.2.2e) when explaining why they may be embarrassed to work in a group. As Rutherford *et al.* (2010) and Lee *et al.* (2014) stated, this could lead to a loss in confidence, so it was important to make all pupils feel at ease in working in this manner. As a first step I

would try to ensure a safe learning environment and when CL was used in the CLP it was monitored to try and prevent any issues arising. I would also follow up this area in the interview questions to see whether pupils' perceptions changed during the study.

Key emerging findings:

- Varying understanding of the term CL between pupils in Y7 and Y12
- Some Y7 pupils suggested that CL involved cheating or copying work
- It appeared that across Y7 and Y12 pupils some valued CL as an approach to learning and some raised concerns about a CL approach.

7.2.4 Analysing the responses on innovation in learning and CLP

Questions 2d and 2e investigated the role ICT and mobile devices played in pupils' work and homework. In response to question 2d all Y7 pupils answered 'yes', as expected, as they had a school tablet with their written answers explaining that they used the device for word processing, mathematical calculations, researching and organisation. Ten Y12 pupils also answered 'yes'; although they did not have school devices, they stated they used their own to access their work and information that would help problem solving, or they used a mobile device to check a task related to the work. Answering question 2e the Y7 pupils explained how they used their school devices to access homework that was set online, together with the instructions for homework or resources to complete tasks.

Without a school tablet the Y12 pupils explained they use personal laptops, mobile phones or other devices to access instructions for homework, resources to complete work and to contact peers for help with work. Some Y12 pupils mentioned using social media to facilitate this contact which linked to question 1f, asking if they made use of WhatsApp, Facebook, or an email group when working. An emergent theme across the Y12 pupils was that they did use at least one of these types of media to contact fellow pupils and to discuss work. However, in contrast, only five Y7 pupils stated that they had used these social media or email to contact their peers for help with work. The Y12 pupils offered further explanation with the two answers below representative of how the year group made use of ICT and social media.

‘In Chemistry and English, we discuss what the prep was and help each other or share answers’ Y12 PN 23

‘All my subjects. We use this to discuss preps and any work people may have missed so we can help them catch up’ Y12 PN 30

These helped to explain how WhatsApp and Facebook messaging allowed them to exchange and share work that helped them to complete prep. I was interested in these admissions as Rambe (2012) investigated whether social media could be used as a support structure to enable CL by university students in his study.

I felt that the answers given by the Y12 pupils suggested that homework was being shared and could reflect the practice the Y7 pupils discussed in question 3 when suggesting sharing or copying work as part of an explanation into CL. I wondered if Y12 pupils were simply using ICT in the way Holub (2008) and Goldstein (2014) suggested to facilitate what was simply copying work from someone else. I felt this was a significant area that would require further investigation through the interviews as in my personal experience I had found pupils in Y10 and Y11 sharing work using

ICT. An aim of the CLP was to provide a platform where pupils could work together in a collaborative manner as demonstrated by Smeets (2005) and Rambe (2012), which would develop their individual understanding and skills rather than just copy answers.

The final question asked the pupils about the types of resources they felt would be useful on the CLP. The most common resources mentioned were notes or further explanations of what they had learnt in class and help when completing their homework. Several pupils also asked for revision materials and practice questions with worked answers that could be used to revise and prepare for tests. One Y12 pupil offered the idea that an area where he could discuss ideas or look at what others had done would be useful to check his work or seek help from. This was one aim of the CLP that would allow pupils to work collaboratively, sharing work and allowing them to solve problems together, building on the idea of how Rambe (2012) introduced the structured use of social media to support learning.

Key emerging findings:

- Pupils in both year groups had different ways of engaging with technology but did in different ways use this to support learning.
- Pupils had made use of ICT and social media as a way to share and work together away from the classroom.

7.3 Summary of emergent themes form the questionnaires

The pupil responses to the questionnaires allowed for an insight into pupils' perceptions and reactions towards ICT and CL, with explanations of these and a demonstration of their confidence in the approaches. The data suggested that there were differences between the two-year groups, in terms of their: understanding of CL, the varying levels of confidence in using ICT or working as part of a group, how they could engage or work with each other and how they made use of ICT in their learning.

The Y12 explanations of CL explained an approach of working together to build or share knowledge that reflected the literature of Panitz (1999), Gokhale (1995), Chuang (2004) and Laal and Ghodsi (2012). The Y7 pupils demonstrated an appreciation of the ideas that CL did involve working together; however, a number entertained the idea that this involved cheating or copying another pupil's work rather than working collaboratively to achieve a goal. Y12 pupils discussed collaborating with others when working to improve their understanding or enable them to solve problems together, I felt this suggested a positive reaction to the idea of using CL in the study. I was interested to follow up on how the different year groups had arrived at their understandings of the CL and how the school's curriculum impacted their understandings.

Five pupils explained they did not feel CL was an appropriate approach to learning and stated how they preferred to work independently. Three of these pupils were in Y7 who did not explain in detail why, whereas the two Y12 explained this was as they had learnt using a different approach at their previous school. I hoped through the interview process to follow up on this area to gain an understanding of their position as it may be significant. Pupils across both year groups did express some concerns

about working with others in a group situation as they felt distractions may affect their learning. Pupils mentioned the ideas reported in literature by Rutherford *et al.* (2010) when explaining how they felt that some of their fellow pupils may waste time or not be on task or could even be nasty if they made a mistake. The latter linked back to the changing levels of pupils' confidence where they were worried how others may perceive them if they made mistakes. I felt this would be an area I needed to monitor and I used Rutherford *et al.*'s (2010) and Lee *et al.*'s (2014) suggestions to produce a framework within the CLP to assist and guide pupils when completing a task using CL. I would also need to consider their views during the research to ensure they could access work and make use of the CLP, so they were not disadvantaged.

The questionnaire responses demonstrate how pupils across the two-year groups had varying levels of confidence in using ICT and demonstrated how they used ICT in different ways when completing work. Questions 1f, 2d and 2e offered an insight into how ICT was being used by pupils to assist in completing their work and indeed suggested that pupils were using ICT and social media to facilitate CL and work together. The ways they were suggesting that they had worked together echoed the research of Rambe (2012) and was significant, as part of the design of the CLP was to encourage collaboration through ICT.

The pupils' answers and feedback to the questionnaire assisted the study by allowing for development and refining of the a priori themes, and considerations for changes to the CLP. They also provided areas of interest to follow up on in the interview stage and provided the key emergent themes stated below.

7.2.6 Key emergent themes from the questionnaire

- Higher-level a priori themes seen in data for CL and innovation in learning; data collected also allowed refinement of a priori themes
- Variance in the levels of confidence across both Y7 and Y12 as well as in each year group in relation to CL and ICT
- Varying understanding of the term CL between pupils in Y7 and Y12, with some Y7 pupils suggesting that CL involved cheating or copying work
- It appeared that across Y7 and Y12 pupils some valued CL as an approach to learning and some raised concerns about a CL approach
- Pupils in both year groups had different ways of engaging with technology but did in different ways use this to support learning
- Pupils had made use of ICT and social media as a way to share and work together away from the classroom.

The final question asked if pupils would agree to take part in the interview process later in the research. In total 32 pupils provided answers to the questionnaire; these came from eighteen out of thirty Y7 and all fourteen of the Y12 that were invited to participate.

Chapter Eight: Data Analysis pupil and teacher interviews

8.1 Chapter Outline and introduction

Chapter 7 analysed and presented the data collected for the online questionnaires to present key emergent themes from the pupils' responses. Through this chapter the data collected from the pupil and teacher interviews is presented and analysed. Each section of the chapter works through an outlined area forming key emergent themes that are then summarised into findings to suggest answers to the research questions in 8.5. These findings will then be discussed with a conclusion on judgements formed in Chapter 9.

Fifteen pupils (eight Y7 and seven Y12) gave informed consent to take part in the interview process and were joined by four physics teachers who were interviewed to gain additional data and perspective on the use of the CLP.

The interviews took place towards the end of the teaching using the CLP with the interview design explained throughout Chapter 4. Following transcription, the interview data was downloaded into Quirkos for coding prior to thematic data analysis, as explained in Chapter 6, which used the final a priori themes (Figure 6.10.2a). The interview questions were split into two sections: the first followed up on areas from the questionnaire and the second investigated pupils' and teachers' perceptions and reactions to the introduction of the CLP (Appendix E contains copies of full interview transcripts).

Research questions three, four and five:

3. What are the uses of CLP as a teaching tool in the case school?
4. Perceptions and reactions: what are users' attitudes to CLP?
5. What are the professional implications of this?

8.2 Analysing the responses – investigating CL and the CLP

8.2.1 Question 1a

The pupils' answers to the online questionnaire demonstrated that both year groups believed that CL involved working with others; however, the Y7 and Y12 had contrasting ideas of the process involved. The Y12 responses to interview question 1a reflected those seen before in the questionnaires, again consistently describing an approach that Gokhale (1995) or Chuang (2004) defined for CL.

Figure 8.2.1a – Y7 and Y12 pupils' responses to question 1a

PN	Q1a. What do you think the term collaborative learning means?
Y7 1	Working together with other people and copying answers
Y7 4	Working as a team, sharing what you know to complete something like a problem or a piece of work.
Y7 6	CL is working together helping each other (pause) to complete some work and may be sharing ideas.
Y12 1	Well, when a few students or more and work as a group in order to learn. I think it is where you share ideas, knowledge or understanding of a topic in order to improve each other understands in that topic.
Y12 3	You can work through a question and ergh... maybe bounce ideas of each other. One of you may know the answer and so explain it to the other. (pause) Also it may just be looking or using someone else's work in order to complete your own.
Y12 7	The idea of working with other students to complete tasks or share knowledge. You may work with another person or as part of a group. I am not really keen on this though.

Using the a priori themes from the final template (Figure 6.10.2), I was able to demonstrate that the Y12 held a good understanding of the term CL as their responses used the key descriptors, language and words from these definitions. The Y12 pupils

consistently explained an approach that allowed for an improvement in knowledge via social interactions that aided learning with the majority of Y12 pupils identifying CL as a way of working together to achieve a common goal. I felt the Y12 pupils were confident in their responses and this allowed for good discussion and explanations as seen in Figure 8.2.1a.

In the questionnaire Y7 pupils struggled to give answers that stated more than the idea of working together when asked to explain CL. In their responses to interview questions 1a four of the eight Y7 pupils had changed their perceptions of CL and provided more detail. When asked what CL was in the questionnaire, Y7 PN 6 answered, 'We learn more with others.' compared to the interview where she explained CL as:

'CL is working together helping each other (pause) to complete some work by maybe sharing ideas.'

This statement was representative of the other three pupils including Y7 PN4, whose response is shown in Figure 8.2.1a, although Y7 PN1 answer was similar to that given in the questionnaire. These four Y7 pupils' explanations were now starting to reflect terms seen in CL literature as the Y12 did by linking the ideas of working collaboratively to build knowledge or solve a problem. The answers suggested that their knowledge had developed during the period of the study and the use of the CLP had aided them in developing this understanding. When interviewed they had been at the school for almost two terms compared to a term when they took part in the questionnaire so they would have possibly had more exposure of CL and used this in other lessons.

8.2.2 Question 1b

Question 1b was used to investigate two different areas: with the Y12 I wanted to further probe their understanding and application of CL whereas with the Y7 I wanted to investigate the ideas raised around cheating or copying.

Figure 8.2.2b – Y12 pupils' responses to question 1b

PN	Q1b. When asked to explain why working with other pupils would help you learn.
Y12 3	You can work through a question and ergh... maybe bounce ideas of each other. One of you may know the answer and so explain it to the other. (pause) Also it may just be talking with someone else and asking for help or ideas to help complete your own.
Y12 4	As I have moved into Y12 I now feel I need to understand how to solve a problem working with others. (Pause...) (Umm...) This is rather than in Y11 or Y10 for GCSE where I wanted to just get the answer. I have a better understanding of this due to study skills we have been taught.
Y12 7	As I said working with other students to complete tasks or share knowledge can help you to learn or you can help others. However, I am not really keen on working with others and prefer to work on my own as I think I complete work better that way

The three answers above (Figure 8.2.2b) were representative of the Y12 answers; PN3's answer represented four Y12 pupils' answers that discussed how sharing or talking over problems enabled them to develop their knowledge or answer a question. I felt PN4's answer was of interest and significant as it suggested a maturing view about the potential benefits of working with others to solve problems rather than just getting the answer from another pupil. This suggested that he had moved away from a practice of just sharing answers in Y10 and Y11 to Y12 with a desire to understand content through developing knowledge of concepts rather than just copying answers. Through question 1b a couple of other Y12 pupils gave similar thoughts that suggested

they believed the step up to A-level required the application of knowledge to solve problems or questions rather than just know an answer.

I also considered that the admission of the Y12 to wanting to just copy an answer linked back to the Y7 pupils' responses that suggested CL involved this idea of copying. Indeed, the teachers' responses (section 8.2.3) expressed the belief that pupils did develop skills during their time at the school with the study skills programme that could help explain the change from Y10/11 to Y12. Both accounts suggested Y7 and Y12 pupils could develop their approaches to - and understanding of - CL during their time at the school. Although outside the scope of this study, a future investigation could examine the effect of school curriculum policy around development of skills through the study skills programme.

Despite the positive engagement with CL, two Y12 pupils PN 7 (Figure 8.2.2b) and PN 5 were not keen on CL, as explained in their responses. This linked to their background and the way they had learnt in a previous school within a different learning culture. Y12 PN 7's explanation suggested that in his previous school it was not something used, and he felt that other pupils did slow him down or distract him which caused him frustrations. Y12 PN5 answers reflected these thoughts and explained how they had been encouraged to work alone and demonstrate their own understanding. Two Y7 pupils also shared concerns about working together with others that became more apparent through their answers to questions 2 and 3 (section 8.3). They explained that they did not like working together and would prefer to work on their own as others caused distractions. I had not witnessed any issues during the study with these pupils and I was pleased they did try to use CL and the CLP. However, it made me mindful to ensure that when using different teaching and learning approaches they must be inclusive and not negatively impact pupils.

In the questionnaire, several Y7 pupils had suggested that CL could be a form of copying or cheating; indeed, I felt this was significant and needed to be followed up through question 1b.

Figure 8.2.2c – Three Y7 pupils’ responses to question 1b.

PN	Y7 Pupil’s response to question 1b. Following on from ‘Why do you think copying is the same as working together/CL?’
Y7 2	I just think we thought this was just the easiest thing to do. (Umm...) You show someone else your work or look at theirs. I guess you can explain things to them, but it is easier to just copy.
<p>Follow up question to PN Y7 2:</p> <p>“Does that mean that you would just copy or let someone copy you rather than maybe try to explain how to do a question or write an answer and is this what you think CL is?”</p> <p>Pupils response:</p> <p>‘(Umm...) (Pause...) I think it is easier to copy. But now and again people try to tell me what to or how I should do work. But usually, they will also show me their book or work. (Pause...) I think CL is working together but that may include copying.’</p>	
Y7 4	If one of us has done the work the others will just copy the answer. I suppose I feel that if I can do it quickly then it will save me sometime and (umm...) then not have to worry about working it out.
Y7 6	I just think that if you are working together you are sharing the answers to the questions or you can ask a friend for the answers that save you some work.

The three Y7 pupils’ responses in figure 8.2.2c echoed those ideas given in the Y7 questionnaire responses (Figure 7.2.3b) that suggested they felt CL involved copying from each other. The discussions offered more explanation that suggested Y7 pupils found it easier to copy work as this saved time rather than working collaboratively to try and solve a problem. I did feel that there could still be a two-way interaction in the

process they explained, as pupils either willingly copied or allowed another pupil to copy their work. This was highlighted by Y7 PN 6 commenting ‘...we allow each other to copy and say what the answers are.’ The way she explained this did demonstrate a form of collaboration or sharing that did involve social interaction to solve a problem. This does mimic the ideas of Gokhale (1995) or Chuang (2004) when defining CL, as knowledge is shared; however, I would argue this process is not CL as the knowledge was copied and not shared or built through social interactions.

The ideas of copying or sharing work were not linked to the CL literature I found; however, through the questionnaire answers I began to investigate the links as detailed in section 7.2.3. These links began to develop out of the ideas from Y7 and Y12 pupils relating to copying and how pupils had been sharing work using ICT and social media.

8.2.3 Teacher Question 1

Using the teacher interviews I wanted to investigate their views on whether the pupils knew what CL meant and whether the school had given them the skills to use it.

Q1. Do you think pupils make use of collaborative learning and know what it means from accessing the school study skills sessions?

Three of the four teachers (TN 1, 2 and 3) explained that they had used CL and suggested that Y12 pupils knew what it was, providing examples of where they had used it. All three also praised the school's study skills programme for providing access to a range of different skills including CL, as teacher PN T2 stated:

The school has a clear study skills programme and I have seen pupils use CL to good effect in the past in Y12.

These answers suggested that the teachers believed the Y12 pupils did understand the school's study skills programme and this backed up why the Y12 pupils gave clear explanations of CL. Teacher two said he 'did not make much use of CL in lessons as he did not really want to use it' as he questioned the value in aiding learning. This view was shared by Teacher four who questioned whether pupils and teachers made consistent use of study skills in all lessons and whether by incorporating skills such as CL it would benefit his teaching practice. Although the literature in section 2.6 outlined the potential of developing learning or skills using CL, it seemed that these two teachers were sceptical. I felt their views suggested some hesitancy in adopting new practices or changing their teaching styles and did reflect some early comments by pupils who also did not like the idea of change. This was an area followed up later in the teachers' interview questions (Section 8.6).

8.2.4 Teacher Question 2

Q2. How do you feel pupils can work collaboratively to gain a better understanding of the work and develop their skills?

All four teachers spoke of pupils working together to share knowledge and build on what they had covered in lessons. Teachers 2 and 3 mentioned the idea of using a pro-forma or task sheet to help script or structure conversations to guide pupils and help them work together. Teacher 1 raised the idea of pupils helping each other with equations and how this had been positive in developing the understanding of a number of pupils in his class through group work in class and for prep. Teacher 4 was able to explain the process of CL but did not feel this was useful in his lessons as he preferred a more traditional approach to teaching through teacher-led explanations.

Teachers' thoughts backed both sides of the argument, with an indication that they did not think all pupils wanted to work in this manner, but they did believe that pupils could develop skills or knowledge in this way. Teachers one, two and three gave examples of how they had successfully used CL in their lessons or for homework to allow pupils to complete a task that demonstrated an improved knowledge in a topic. Teacher four was still opposed to working in this manner as he honestly felt that his methods of traditional teaching allowed for pupils to develop skills without this approach. Indeed, his experience of thirty years of teaching with exceptional examination results demonstrated that his approach did work well, and his pupils seemed not to be disadvantaged with this approach.

8.3 Analysing the responses - confidence in CL

8.3.1 Question parts 2a and b

The data patterns from the questionnaires demonstrated how pupils' confidence varied across both year groups and within the year group when discussing approaches to CL and ICT (e.g. Figure 7.2.2a and 7.2.2b). The data suggested those in the Y12 had more varied responses with less confidence overall when compared to the Y7 pupils across all the responses (7.2.2). Questions 2a and b in the interviews sought to build a better understanding of the factors that could affect their confidence of CL and in using the CLP.

Figure 8.3.1a – Five pupils' response to question 2a.

PN	Q2a: Does working with other students or as part of a group give you confidence (or not) in your ability to answer questions/solve problems/learn new skills/understand work?
Y7 3	I think if you can see that someone else understands the answer after you have told them how to do it then that makes you feel happy. (Umm...) I think wow that was good, or I can do it.
Y7 6	If I can answer a question that a friend cannot then I feel more confident.
Y12 3	By being able to do questions I think this in turn gives me confidence in my ability. If I am able to show my friends in the class or when doing homework with them then it is good to know I am doing well.
Y12 6	If I work with others and I can explain things to them which helps me to feel better about what I know and that I understand things.
Y7 2	I do not really like working in a group as I worry I may get things wrong. I like working with my friend or two friends but not really many others. It is not a good feeling if you answer something wrong in class or with your friends sometimes.

The first suggestion in responses to question 2a and b was the confidence that pupils felt when they received positive feedback from others when working collaboratively as Y12 PN3 expressed above (Figure 8.3.1a). This response was representative of several pupils' perceptions in both year groups, suggesting how their confidence grew

when they correctly answered or assisted another pupil. When questioning pupils further through question 2b, a Y7 PN6 commented that 'If I can answer a question that a friend cannot then I feel more confident.' This answer, and others suggested there was an element of self-gratification linked to this sense of achievement. A further demonstration of this was expressed by Y12 PN 4, explaining that he felt better when he received praise from a friend rather than a teacher giving him praise. He explained this saying 'it makes me feel better, happy and confident'.

This response was backed up by others suggesting that both year groups reported a sense of enjoyment when they received praise from a friend within a group setting for helping or correctly answering one of their questions. Through question 2b, three Y7 pupils explained they enjoyed this praise and two Y12 pupils said how they wanted to be considered clever by other pupils. This potential desire for praise may fall within the realms of intrinsic and extrinsic motivating factors (Plant and Ryan, 1985) where pupils wanted to answer questions as they felt that praise was due reward and motivated them to learn or work harder.

The Y12 responses interested me as the pupils spoke of a desire to be considered clever and really wanted other pupils to ask them questions. Both pupils stated that it gave them confidence and motivation. This idea suggested further evidence of self-motivation linking to the ideas reported by Green *et al.* (2012) as factors for the engagement and academic performance of pupils. It certainly seemed to suggest within these answers that pupils were seeking the gratification from others to build their confidence or earn the approval of their peers to answer questions for them.

8.3.2 Question 3a

Q3a. How do you feel about having dialogue/speaking to other pupils about your work? Do you feel it affects your understanding of the work or develops your skills?

The data collected in the responses from question 3a linked to the higher-level theme of CL and there were similarities and links between the pupils' responses to this question and questions 1a and b. In response to this question eleven out of fifteen pupils suggested that using the CLP and CL had helped them to improve a skill or knowledge. The ideas presented by these eleven pupils across Y7 (six pupils) and Y12 (five pupils) echoed the explanations of how working collaboratively can improve knowledge and skills, as Gokhale (1995) and Chuang (2004) stated. Indeed, as set out in the literature review (section 2.5.2) Laal and Ghodsi (2012) believed that CL can trigger the higher-level thinking skills that Chen and Chuang (2003) suggested allowed learners to access the higher levels of Bloom's Taxonomy. Although the study did not set out to examine if this was possible, pupils in response to this question highlighted several skills: analytical, communication, digital, mathematical and problem solving that they believed they had developed whilst using the CLP (Figures 8.3.2a).

Figure 8.3.2a – Pupils perceived development of skills during study

Year	Student extracts demonstrating their perceived development of skills whilst using the CLP with CL during the study.			
Y7	Improved my understanding of a topic... (PN Y7 2)	I think my communication skills and the way I explain things... (PN Y7 4)	Maths skills when answering questions (PN Y7 7)	I am not sure it has. (PN Y7 3)
Y12	I have built a better knowledge and understanding of a topic. (PN Y12 4)	I feel I have improved my mathematical and problem-solving skills through using the CL. (PN Y12 2)	I do not think that it has really made a difference. (PN Y12 5)	Improved problem-solving skills through working and talking to others. (PN Y12 6)

Certainly, some of the pupils have been able to demonstrate a move towards creating and forming new answers or knowledge through the inter-personal discussions that Vygotsky (1978) explains develop cognitive skills. No 'before and after' testing to measure the pupils' skills levels was conducted, but the pattern in the data suggests that some pupils felt more confident in these skills after using the CLP.

Four pupils - two in each year - stated that they did not feel any skills or knowledge had improved through their use of the CLP. When questioned as to why, these pupils gave answers that represented a lack of desire to use CL and stated they did not feel working with others necessarily benefited them or helped them improve. One pupil, Y12 PN 7, was clear again that he preferred to work on his own, which was followed up on in the previous section. This data did reflect earlier findings from the online questionnaire where some pupils in both years indicated that they felt CL was not an approach to learning that they valued.

8.3.3. Question 3b

Through the answers to question 2, seven out of fifteen pupils also mentioned a lack of confidence or how making mistakes led to a sense of frustration that caused a loss of confidence. The responses to question 3b (Figure 8.3.3a) also highlighted these thoughts with Y7 and Y12 pupils mentioning how their confidence could be lost or changed by making a mistake or answering a question wrongly in front of their peers.

Figure 8.3.3a – Four pupils’ response to question 3b from Y7 and Y12 pupils

PN	Question 3b: Does it affect your confidence (positive or negative) if you get something wrong when working in a group?
Y7 2	Yes, I do not really like working in a group as I worry I may get things wrong. (Pause...) I worry about what others think of me when this happens.
Y7 8	Yeah I think it might be a bit negative as if you look bad or get things wrong then others may laugh at you. I would not like to get things wrong. But if you can get things right then you do look good. (PN Y7 8)
Y12 2	In the past I think umm yes it may well have. I used to make silly mistakes and would be worried about passing those on to others. I feel more confident now and if I do make a mistake then hopefully someone else in the group will correct me or help me to see the mistake I have made.
Y12 6	Not really now but it did in earlier years. I think it probably helps me now as I can then correct it. However, in the lower years I would be worried about getting something wrong or not being able to answer a question as people may think I do not know or am not clever.

Pupils’ feelings suggested that confidence could quickly change from being high to low through their answers and interactions within a group and therefore was a cause for not wanting to participate in CL. Probing pupils further about their concerns using question 3b, demonstrated that pupils’ worries of how their peers perceived them as “clever” (Y7 PN 5) or “thick” (Y7 PN2) was dependent on their answers to questions. These perceptions fall into the area of anxiety, an issue that Lee *et al.* (2014) discussed; as presented in section 2.6.4, this was a problem that pupils feel stops them from wanting to work collaboratively. This was demonstrated by Y7 pupil PN2 who continued that she ‘felt reluctant to answer questions in a group setting’ as this could cause her anxious or negative feelings if she got the answer wrong in front of her peers. The Y12 data also suggested this idea with pupils questioning how other

pupils perceived them based on their answers. Y12 pupils felt it was important to be considered clever and making mistakes made them doubt themselves and their ability to complete work or answer questions correctly. Y12 PN4 explained 'If I get things wrong and then it can annoy me'; this was an idea echoed by two other Y12 who stated this led to them sometimes giving up on a question or seeking help from a teacher.

Rather than frustrations being the only outcome of incorrectly answering questions, two Y12 pupils raised the idea of developing resilience and learning by reflecting on the mistakes that they or others had made when using CL. Y12 PN 6 (Figure 8.3.3a) explained how over time she had become more self-confident and that her confidence did not always drop if she did make a mistake. She also reflected that the 'higher stakes' of knowing that A-level exams were imminent could add pressure, but she wanted to build an understanding, not just correctly answer questions.

Y12 PN2 also explained how he used to worry about mistakes but through CL working with others could identify these mistakes and help him to correct them. I felt these explanations demonstrated a maturity as the pupils were able to consider how their perceptions had changed and the idea they could reflect and learn from their mistakes. These points of view could be seen from other Y12 pupils' responses and indeed teachers explained that through this process pupils could build resilience.

8.3.4 Question 3c

Through the questionnaire, interview questions 2 and 3b, pupils had already mentioned that a lack of confidence and making mistakes were issues that would prevent them from working collaboratively. I used question 3c to further explore this area as in the questionnaire and literature (section 2.6.4) other ideas had been mentioned regarding social interactions and distractions.

Figure 8.3.4a – Four pupils’ response to question 3c.

PN	Q3c: Is there any reason why you would not want to work as part of a group?
Y7 3	Sometimes people just want to chat or play games or watch videos and I do not want to be distracted by others. I think as well if I kept getting things wrong or others always disagreed with my answers.
Y7 4	Get annoyed with some people and sometimes have to work with people you do not like so that means I don't listen or may be silly. May be if I always got the answers wrong I would feel bad as well.
Y12 2	No, I am happy working in a group and feel as though I lead the group and keep it focused. Sometimes I just prefer to get on and work on my own and I can get distracted if I work with some people in the class.
Y12 5	As I said I prefer to work on my own. I do get annoyed if others do not work at my level or are slower than me. I also think I get distracted by working with others.

The responses of pupils as to reasons for not wanting to work collaboratively are represented by the four responses above that suggested distractions caused by others was the biggest issue. Y7 and Y12 pupils felt these distractions occurred through chatting and silly behaviour leading to a loss of concentration; indeed, this reflected

those mentioned in the literature by Rutherford *et al.* (2010) and Lee *et al.*, (2014). Y7 pupils mentioned the idea of silly behaviour or others in the group playing games on their tablet devices.

A couple of responses in Y12 including PN 5, (Figure 8.3.4a) mentioned that not all pupils do the same amount of work or work at the same speed, which meant they did not feel everyone contributed equally. The pupils did suggest that more guidance could be given by teachers to help prevent some issues when using CL outside the classroom. In fact, Y12 PN2 was one pupil who stated they wanted to take a lead when working in a group and felt this was a way to organise and ensure everyone was working on certain tasks.

8.3.5. Key emerging findings on CL from questions 1 to 3

- Some pupils had developed a practice of CL through using the CLP during the study, along with some believing they had developed skills or knowledge.
- Anxieties about confidence and levels of distraction caused concern for some pupils when using CL.
- Teachers and pupils had hesitation towards changes in teaching and learning approaches.

8.4 Analysing the responses – ICT and the CLP

8.4.1 Questions 4a and 4b

The first significant difference was the way that pupils used ICT and social media (Figure 8.4.1a), In Y7 only four pupils admitted to using one of the platforms with email the most common and one pupil using email and WhatsApp. By contrast all the Y12 pupils discussed using social media as a way to communicate or share schoolwork. They made use of Facebook and WhatsApp to message another pupil or a group of pupils.

Figure 8.4.1a – How is ICT/social media used to communicate for schoolwork

ICT/Social media	Facebook	WhatsApp (Messaging)	Text message	Email
Y7 (8 pupils)	None	Yes – 1 pupil	None	Yes – 4 pupils
Y12 (7 pupils)	Yes – 5 pupils	Yes – 4 pupils	None	Yes – 1 pupil

As stated by Childs *et al.* (2007), Rambe (2012) and Traxler (2014), social media, mobile devices and messaging services allowed another way for pupils to communicate. The data collected from pupils responding to question 4a and 4b (Figures 8.4.1a and b) suggested that this practice was widespread in Y12 and used by Y7. The responses in Figure 7.3.4.1b, were representative of the Y12 pupils and four Y7 pupils when explaining how they used email, Facebook or WhatsApp to message other pupils to discuss work. As the pupils' responses suggested, a plea for help was sent before the answer or working out the problem was then supplied by members of the group.

Figure 8.4.1b – Four pupils’ response to question 4a.

PN	Question 4a: Have you used a WhatsApp or Facebook or email group (or other) to complete preps or for help in any of your subjects? What have you used it for and what resources or discussions have you taken part in?
Y7 2	No, I do not use Facebook or WhatsApp. I do email friends to ask for help and also I do ask teachers or email them for help.
Y7 4	I do not have Facebook. I have WhatsApp and know that some of my friends use it to do work and complete their preps and ask each other questions. I have once or twice asked for answers.
Y12 1	We do have a WhatsApp group... We use it to ask questions or if we are stuck... Someone will usually have answered it and then send a picture of their answer or may be the working too.
Y12 3	We have a Facebook group that we share our preps on and if we are stuck then someone will ask for help and we can let them know the answer or how to solve the problem. I have also used WhatsApp and sent answers to friends on there. I do sometimes arrange to meet friends using it so we can do the work together.

N.B. Q.4b was used to follow up on any interesting comments in this section.

The statement by Y12 PN 1 interested me as it implied that Y12 pupils were sharing answers or copying one another. A similar idea can be drawn from Y12 PN3 response that stated ‘...ask for help and we can let them know the answer...’ and indeed mentioned in other Y12 responses. The four who stated they used social media messaging also gave some explanations that included the idea of sharing or copying answers and work. These statements suggested that the practice of using ICT to copy or share work, as mentioned in the works of Holub (2008) and Goldstein (2014), was being used by pupils in these two-year groups. The Y12 responses also resonated with the ideas mentioned by Y7 pupils in responses to the questionnaire (section 7.2.3) and interview questions (section 7.3.2) when explaining their understanding of CL that

included references to cheating or copying. Y7 pupils had described copying as a form of CL and explained that they had copied from one another with and without ICT as the Y12 responses to this question did, including the two in Figure 7.3.4b

Although the responses discussed how work was being copied, comments in the answers from both year groups suggested that some collaboration was taking place to help build knowledge. When I followed up Y12 PN3 response to question 4a in question 4b he explained:

'I do find it (WhatsApp) useful if there is an equation I do not understand. Then I can ask someone to go through and show me steps they used, and I can learn from that.' (PN Y12 3)

Y7 PN7 also explained how he could '...ask my friends how to answer the question or they can go through the working.' These comments suggested that both copying and CL were able to take place using ICT and social media by the Y7 and Y12 pupils. There was evidence to suggest that pupils were able to make use of ICT to support CL as Rambe (2012) stated, but also they were, as Goldstein (2014) alluded to, just using it to copy work. It also seems apparent from the improvements being made to the school's ICT provision that more pupils having mobile phones (Beatbullying, 2012) or tablet devices, and the internet being more widely available, meant it was becoming easier for pupils to share information through whichever approach they decided.

As a teacher I was pleased to hear the explanations of Y12 PN 3 and PN 4 that reiterated a point made previously by Y12 PN 2 in response to interview question 1 that she wanted to develop her knowledge rather than just get the correct answers. This demonstrated a shift by some Y12 pupils: rather than just wanting the answer, they were trying to improve their knowledge using CL both with and without ICT. This linked to the fundamental ideas of CL (Gokhale, 1995 or Chuang, 2004) and with

Vygotsky's (1979) explanations of facilitating learning through social interactions and sharing knowledge to achieve a goal. Indeed, this idea suggested a learning journey going from Y10 to Y11 into Y12 where their desire changed from just copying answers to wanting to understand a subject and build knowledge. I also felt that these responses could suggest that the study skills programme in the school was developing learners' skills and that in time the Y7 pupils may follow this path to further understand CL; however, a further study would be needed to investigate this.

8.4.2 Teacher question 3

Teacher question 3: Do you know of any pupils using WhatsApp or Facebook, VLE or email groups to complete preps (homework) for you or to help each other in your subject?

Teachers expressed a sense that pupils were using ICT, social media and phones to communicate ideas or share work outside of the classroom. As teacher one stated, she knew of a message group after a conversation with Y12 in class that was used to sharing work or, as she described it, sending the answers to each other. This was seen in the responses above and discussed by some of the pupils in answers to previous questions. The teachers did not know if the use of ICT and CL in this manner was benefiting pupils, but certainly felt that it had impacted on homework with some pupils who they expected to struggle getting higher marks. Teacher two stated:

'When marking preps (homework) it appears that answers were often simply copied by large numbers as they had common mistakes and lacked working out.'

As teacher three alluded to, pupils were working together but this was not necessarily being done in the right way and more than likely this was a high-tech form of cheating that teachers could not trace or prove. The teachers admitted it caused frustrations as they wanted to see an individual pupil's understanding but did not know whether it was their own work or whether the group had done it together or if one pupil had just sent around the answers.

As teacher four explained, pupils had told him these groups existed, but he did not know what or how they were being used and had no way of monitoring them. I would suggest this is significant as data here from multiple pupils matches the findings of Holub (2008) and Goldstein (2014) on how ICT is used to "learn collaboratively", otherwise known as copying. All this suggests that some pupils are technologically ahead of some of their teachers.

8.4.3 Key emerging findings on ICT and the CLP

- Pupils have been using ICT and social media collaboratively to enable them to complete work and learn together outside of the classroom in different ways.
- This had demonstrated a possible innovation by combining CL and ICT that may have led to new knowledge in this area and possible demonstration of what a CLP could do.
- Pupils and teachers are at different stages of technological advancement.

8.5 Analysing the responses - perceptions and reactions towards the CLP

8.5.1 Question 5

I asked this question to investigate pupils' preconceptions of the CLP to build an understanding of their views and work towards answering research question four. The answers in the table below were representative of the different feelings between the Y7 and year 12 pupils.

Figure 8.5.1a – Six pupils' responses to question 5

PN	Q5. Did you have any thoughts/preconceptions about using the CLP or worries as to how your teaching could change?
Y7 1	Not really. I think it has just been the same way that we had been taught since moving to this school. I think we tried to do more things together in homework but that was fine.
Y7 3	Not really, I thought it would be similar to how we were taught before as you explained I thought we may need to do more things together. I am happy working with others and using computers.
Y7 7	I thought as in other subjects we would make use of our tablets, online resources and work would be online with a bit more working together. I was not worried as it seemed the same as what we had done, and I like working with my friends.
Y12 2	I guess I did wonder if we would have to do lots of work on computer. I do not think I could work if it was all on computers. As that would not be good. I also was wary of who I may have to work with if everything had to be done in groups.
Y12 4	No, I was unsure if it would really change anything. I thought there would be more working together and possibly more IT or computers used. May be different from the more traditional teaching.
Y12 7	I was worried about having to work with others. As I had explained before I am not used to having to work with others and this is different to how I have been taught before. I prefer to work on my own and get the work done rather than having to go through it with someone else that may distract me or slow me down.

The Y7 pupils' responses to question five as represented by the three responses above (Figure 8.5.1a) suggested that they were not worried about using the CLP or working with others. As they explained, the way of working sounded familiar, making use of their tablet along with being able to work with others that Y7 PN 3 and PN 7 seemed happy about. Answers across the year group suggested they did not feel that it would be a significant change to their way of learning and there were not concerns or negative comments related to this.

However, the Y12 responses were a total contrast to the Y7 ones; their answers suggested apprehension towards the use of CL, the CLP and ICT in lessons or the idea of having to work with another pupil or in a group. This was clearly expressed by PN Y12 2 who stated: "I do not think I could work if it was all on computers. As that would not be good." The Y12 responses suggested concerns about the possible change from a traditional or familiar way of being taught to an approach using different or innovative methods. The answers in Figure 8.5.1a represented the worries that the Y12 had, especially it seemed about working collaboratively with others or possibly having to make use of ICT. Through discussion in the interview, I was able to clarify that Y12 were worried about a sudden change from traditional methods of teaching to an innovative one. I was pleased to hear that despite these preconceptions, once the Y12 pupils found out about and experienced the CLP in lessons they were not as worried and, as demonstrated later in this section, the majority reported positive feedback from using the CLP.

8.5.2 Teacher question 4

At this stage of the analysis I was interested to compare the pupils' preconceptions with those of the teachers I had interviewed through their responses to question four in the teachers' interviews.

Teacher Q4: What are your thoughts/preconceptions about using the CLP or worries as to how your teaching could change? What may be the barriers and benefits to using this in your teaching?

In response to this question I felt that three of the teachers (TN 1, 2 and 3) offered positive ideas of implementing a CLP. Teachers suggested that they felt by getting pupils to work together using the ICT resources this could potentially foster the development of knowledge and building of skills. TN 1 remarked "A positive side is if you can get pupils to help each other." With TN3 commenting "I can see how it would develop skills and pupils' learning by using the collaborative area and resources".

However, they did discuss the need to be cautious as they all believed it would take time to implement such a platform and there could be some resistance or hesitancy for pupils to be taught in a different way. TN 1 discussed this further highlighting the potential issue of pupils needing to use a computer or tablet in class and that she would be reluctant to teach in this manner. TN 4 also questioned whether using a CLP would aid learning in his classes and believed it would in fact negatively impact his teaching of the physics course. I asked why and he explained

"I do not feel confident in setting up or using the software involved in producing the CLP and feel this would take time away from my planning."

Both responses highlighted areas that required consideration for professional implications (as further discussed in section 8.6) as I would not want to force teachers to adopt a practice they did not feel comfortable with or consider useful. Indeed, such tensions were highlighted by the OECD (2014) discussing teachers and schools' concerns with implementing innovation in teaching practice. As TN 2 went on to explain, although he was keen to use a CLP, he questioned how older pupils may respond to a new way or style of teaching.

This reflected the Y12 preconceptions and further suggested that the contrasting views of the Y12 pupils compared to the Y7, were linked to their time in the school and familiarity to a teacher-led curriculum, whereas the Y7 pupils who were new to the school had become accustomed to - and only knew of - the modern curriculum that incorporated innovations and ICT. Therefore, to overcome these concerns or resistance it was not enough just to cite the desires of the OECD (2014) and national policy (DfE, 2014) to teachers or pupils but to find a way to demonstrate with evidence the possibilities of innovation that I hoped this study would achieve.

8.5.3 Question 6

Despite some concerns raised by pupils in their answers to previous questions, I hoped that their responses to question six would provide positive feedback on the CLP as well as being able to highlight possible barriers. I had designed this question to help answer research questions three and four to gain an understanding of how the CLP could be used and pupils' reactions to its use.

Q6. What are your thoughts and reactions to the introduction of the CLP which we have used over the course of this term?

Figure 8.5.3a – Pupils' positive feedback on the CLP

Y7 Feedback	Y12 Feedback
I was able to use the resources to work together on homework with friends that was good. (PN Y7 1)	I liked the idea that there is an area where we can share work... Also, it was useful when working through exam question problems. (PN Y12 1)
Equation explainer and the revision questions and worked answers (PN Y7 2)	It has worked well as a framework for me and other students to work together or collaboratively (PN Y12 2)
I felt there was a good number of different things on there that helped me. (PN Y7 3)	I have really liked the brief notes sections and thought there was a good range of other resources on the CLP. (PN Y12 4)
I liked being able to ask friends and other pupils how to do something in the shared area. (PN Y7 8)	It was good how we were able to work together and complete a set of questions in the collaboration area. (PN Y12 6)

The responses in Figure 8.5.3a represented the pupils' answers to this question and suggested that all pupils had engaged with the CLP to complete at least one activity and tried to use the collaboration area. I was pleased that pupils had engaged with the learning resources: Y7 found the equation explainer, revision notes and questions

particularly useful whilst the Y12 made good use of exam practice questions and interactive animations. This reflected the research of Issroff and Scanlon (2002), Rambe (2012) and Chanug (2014) (Chapter 2, section 2.5) demonstrating that pupils had positive learning experiences when engaging with resources using online learning environments.

An aim of the CLP was to facilitate CL, I was worried by the negative preconceptions towards CL displayed by Y12 in response to question five above that this may not have been experienced. Throughout the teaching I felt pupils were engaging with the CLP, and indeed monitoring the collaboration space demonstrated that pupils were working together. I was pleased to hear in answers from Y12 to this question that five of the seven Y12 pupils mentioned a positive learning experience whilst working collaboratively as part of a group or with another pupil whilst using the CLP. Y12 PN6 stated:

‘It was good how we were able to work together and complete a set of questions in the collaboration area.’ (PN Y12 6)

I felt these responses were significant as they demonstrated that the Y12 pupils used CLP and that they had at least tried to work collaboratively. These ideas of CL were echoed by the Y7 responses, as six pupils stated how they had used CL with the CLP that helped them complete homework or revision with support or guidance from their peers. These responses suggested positive engagement with the CLP and the resources it offered, reflecting the research discussed in Chapter 2, section 2.5 outlining the potential for positive engagement of pupils with innovations seen in the literature of Gokhale (1995), Chen and Chuang (2003) and Rutherford *et al.* (2016). I felt that the positive responses and change between the preconceptions of the Y12

and their reactions to using CL with the CLP suggested that it was possible to introduce innovations to the curriculum as outlined in the school's academic and teaching policy (School X, 2017).

Along with the positive feedback pupils were also able to critically reflect on the CLP, raising concerns around areas that they believed did not work or function well.

Figure 8.5.3b – Pupils' concerns about the CLP

Y7 Feedback	Y12 Feedback
If incorrect answers are put in CLP by other pupils and not removed (PN Y7 1)	It can take a while to find things which, I guess can be a bit annoying. (PN Y12 1)
I was not sure that it always had the information I needed to work and sometime people wrote the wrong answers down. (PN Y7 6)	It can be a bit slow and I need to search around to find things. This can be frustrating as it takes time and I could do things in another way but need to complete the activity I have been set. (PN Y12 3)
Silly suggestions in the CLP by other pupils in shared homework area. Also, I did not use many of the extra PPT resources as it took too long to find the information I required. (PN Y7 3)	Sometimes it was a bit difficult to find some things on it. (PN Y12 5)
Difficult to access some areas or took time to find work (PN Y7 8)	I prefer just to get on with my work and use my notes from class. (PN Y12 7)

I wanted to investigate the barriers and concerns that pupils had as this would be a key part of the research that would help inform professional implications and to see how to improve the CLP. I thought this also demonstrated the open and honest nature

of the research in helping to fulfil the ethical approach I had outlined in Chapter 5. Pupils reported two main issues: they felt it could take time to access resources, and incorrect answers or working were written in the collaboration area.

Despite how I had tried to design the CLP with a clear navigation menu on the left and easy links on the welcome page (Appendix A, Site map and Welcome page), pupils did have issues when navigating around the pages. This aspect reflected issues raised in the review of ICT in the curriculum, and the issues of pupils not being able to access or understand material was highlighted in the *e-strategy: Harnessing Technology: Transforming learning and children's services* (DFES, 2005) review. This caused users to turn off or decide to use another method for completing the task so I would need to address this in any future versions of the CLP.

The second issue reported by the Y7 and Y12 was incorrect responses or silly comments unconnected with work being written in the collaboration area. This was an issue I found reported by Issroff and Scanlon (2002) and Rambe (2012), as detailed in section 2.4.5. I tried to mitigate this by regularly monitoring the collaboration to remove incorrect work or silly comments. The concern I had was either that a pupil could pick up a misconception or mistake by another pupil and include this in their work, or that a silly comment made was bullying and would need to be dealt with in an appropriate manner. Issroff and Scanlon (2002) and Rambe (2012) also found some pupils would just give away answers, which meant that CL would not be used by pupils to develop their knowledge. I did not find this happening too often; I did find mistakes that I corrected and on one occasion had to address in a lesson as two pupils had included it in their homework. In a future CLP I would try to monitor it more frequently; although this is not always possible, it is the only way to facilitate the use of the collaboration area in this design.

8.5.4 Question 7

The data suggested there were significant positives and negatives given by both year groups linking the CLP to their perceptions of whether they felt it had been of benefit or not to them.

Figure 8.5.4a – Four pupils’ responses to question 7.

PN	Q7. Do you feel CLP has aided or disrupted your learning in physics? Why/Explain.
Y7 3	It has been useful in class and works well with how we have used iPads in lessons and is useful in preps. My test result was better this time, so I guess it has helped me to do well in the test.
Y7 4	I am not sure whether the (Umm...) CLP has helped me get better in the subject. (Pause...) I do not think the iPads are used much in school (Umm...) so have not worked in many subjects. I just think some pupils and teachers would not use a CLP.
Y12 2	It would be hard to prove that the CLP had made me better at physics, but I felt the number of resources had certainly helped with learning the current topic.
Y12 6	Yes, I think it has aided my progression this term and I like to use the resources as I have said. I think they demonstrated how I could work with others as I was worried about this.

Pupils answers offered benefits and positive thoughts on how the CLP had helped or allowed them to develop knowledge or a skill as well as comments on barriers to using it. Comparing the responses between the year groups six of the eight Y7 and five of the seven Y12 gave positive feedback and believed or perceived that the CLP had aided their learning. The responses from Y7 PN 3 and Y12 PN 6 (Figure 8.5.4a), were representative of these statements, giving examples of how the CLP had aided their learning. Reflecting on these responses along with those to previous questions, for example questions 3a and 3b (Figure 8.3.3a), pupils’ answers strongly suggested that they had the perception of improving knowledge or developing skills having used the CLP. Indeed, within these answers pupils’ responses echoed ideas seen in the

literature of Laal and Ghodsi (2012), Swann (2013) and Lalima and Dangwal (2017) that helped to argue that a combination of CL and ICT could benefit pupils' learning and develop their higher-level skills.

It was also clear from the pupils' responses that there were some concerns when using the CLP, CL or ICT, as the responses of Y7 PN 4 and Y12 PN2 (Figure 7.3.5.4a), questioned whether the CLP did aid their learning. Through the analysis of the interviews and questionnaires I had been open as to the concerns' pupils had with learning in this manner, as these would form the basis for the judgements on the barriers to this approach. Indeed, as Y12 PN2 stated: 'It would be hard to prove that the CLP had made me better at physics...' and a couple of other pupils raised concerns about whether it would be fully used in other subjects or by other teachers. Through my reading in producing the literature review it was clear that no literature convincingly demonstrated that the use of ICT that aided pupils' learning outcomes. A further point to note was that the two pupils Y12 pupils (PN 5 and 7) who throughout the study had stated they were not keen on CL due to their previous education background then raised this point again.

I felt that this research using the CLP was able to offer new ideas and a way to develop a learning environment that could be used to aid, develop or increase pupils' skills or knowledge within this case study. To fully judge if the CLP could improve learning, a longitudinal study with two trial groups would be needed with one set utilising the CLP and another group taught without it. In the realms of educational research this could be unethical (Cohen et al., 2011) as you may be withholding or disadvantaging pupils' learning. I suggest here that rather than stating whether it did or did not improve learning, it could be seen that confidence levels of pupils certainly rose through the study, along with them believing their skills had improved.

8.5.5 Key emerging findings on perceptions and reactions towards the CLP

- Pupils had a range of perceptions and confidence in CL and ICT, some of which improved using the CLP.
- Ideas of pupils and teachers having hesitation or resistance to changing ways in which they learn due to their perceptions and reactions.
- New ideas presented as to how a CLP could be used to aid learning in the case school.

8.6 Analysing the responses - professional implications

8.6.1 Teacher questions 5 and 6

The four teachers' responses suggested positive feeling towards the use of a CLP with three of the teachers acknowledging the pupils' perceptions that suggested they had benefited from using the CLP. Teacher two noted this in his answer but also raised the concern he still had about the time required to implement the CLP (Figure 8.6.1a).

Figure 8.6.1a – Two teachers' responses to teacher question 5.

TN	Q5. Do you feel the use of a CLP would aid or disrupt teaching and learning in physics?
T2	I can see how it could develop skills and pupils' learning if the activities it used were matched to the needs of pupils. I think it could therefore benefit their learning but would require a lot of time to set up and run.
T4	As I have taught for over thirty years, I would not want to change the way pupils work in my lessons. I have taught in the same way without the use of much ICT for the last ten years and have achieved good results.

The answers of teachers one and three demonstrated an openness to trialling a new approach as they believed it could aid learning, however teacher four was more

hesitant as he believed the new approach would cause disruption. Teacher four was still unconvinced about the CLP and questioned the need to change his teaching practice from a traditional approach to an innovative approach. He expressed a similar point of view throughout the interview and when questioned further through question six, stated that he did not necessarily see the benefits of the CLP and worried that it would disrupt his teaching and pupil learning by explaining.

'I feel it would take time to set up, update and monitor the collaboration area that would affect the time I needed to mark, teach or plan lessons.'

It seemed that despite our discussions and explanations of how the pupils felt about the use of the CLP he would not be keen to trial it.

The three other teachers reflected on our discussions and in their answers to question six agreed that they would trial the CLP although they again did highlight some concerns that they saw as barriers to using it.

Figure 8.6.1b – Two teachers' responses to teacher question 6.

TN	Q6. Would you consider using the CLP to go alongside and aid your teaching?
T1	I am slightly worried about the time it may take to set up, but I guess once it is there it can be reused or built upon. Also, I think as you explained I would need to carefully monitor the collaboration area to check pupils' work.
T3	I would be happy to use a CLP and believe as you have shown it can be used to help pupils. I do worry about the time it may take to set up. Certainly, though if it benefits them and can help develop skills then it would be worth trying.

Teachers one and three (Figure 8.6.1b) acknowledged the potential benefits of using a CLP; however, they stated concerns around the time to produce, run and learn how to use it. Time seemed to be a crucial point mentioned in several of their answers throughout the interviews that caused a concern. This highlighted the teachers'

perceptions of how important and valuable their time was and echoed the thoughts of Stevenson (1997), Moore (2004) and DfE (2014) when looking at why new initiatives or innovations fail due to a lack of time in preparation and planning before the initiative is rolled out.

All four teachers had also mentioned throughout the interviews some concern in moving away from a traditional teaching approach to a modern blended learning approach, which echoed some concerns mentioned by Y12 pupils. These views from the teachers mirrored the argument that the OECD (2014) and Williams' (2016) outline stated that if teachers are not convinced by a new approach then it is less likely to succeed or produce the desired learning outcomes. I felt the teacher interviews had added an important dimension to the research allowing myself to reflect on the concerns to address professional implications.

8.6.2 Key emerging findings on professional implications

- Reasons for teachers being hesitant or resistant to changing approaches due to their perceptions and confidence in traditional methods of teaching.
- A need to address the concern of time in regard to setting up, running and monitoring the CLP.
- A willingness for teachers to be open to suggestions on new approaches.

8.7 Pupils' language through the questionnaires and interviews

Across the questionnaire and interviews there was a difference in the way questions were answered and the language used between the Y7 and Y12 pupils. Indeed, maybe body language could also have been investigated to see how this was shaped by responses and whether this would have provided further variation. The difference in language was displayed in the way pupils answered questions and elaborated on their answers. The Y7 answers tended to be shorter and lack specific or technical terms that are seen in the literature, whereas the Y12 pupils delivered a higher level of detail that usually contained specific examples or linked to other ideas. This could be seen when looking at their understanding of CL and a definition that encapsulates this within the case study school.

On reflection, when considering the age difference, I should have expected there to be a difference in the language used between the Y7 and Y12. However, during the interviews the Y7 pupils seemed to gain more confidence in explaining their perceptions, and discussions followed that collected detailed data matching those of the Y12.

8.7.1 Key emerging findings on pupils' language

- Y7 and Y12 difference in language should have been expected considering the difference in their ages
- Over the course of the study pupils in Y7 became more open and confident in their discussions leading to more detailed conversations.

8.8 Summary of the findings from data analysis

The analysis of the data in this chapter suggested several emergent findings based around the thematic analysis and use of the template with a priori themes. This summary seeks to draw together the emergent findings with the research questions they work towards answering, before the findings are examined and theorised to produce the recommendations and conclusion.

8.8.1 Findings to suggest answers to research question three

Q3. What are the uses of CLP as a teaching tool in the case school?

The findings demonstrated that pupils came into the study with an appreciation of CL. However, as the data demonstrated, this varied between Y7 and Y12 based on their exposure to the school's study skills programme. It also suggested that pupils had been using ICT and social media in order to work together in a collaborative manner as well as to just share answers in order to complete work or homework.

Using the CLP, I was able to build on the skills that already existed in the Y12 pupils, while fostering and developing the Y7 pupils' CL skills and approach to learning. The CLP was used by all pupils who were able to make use of a variety of different learning activities and resources that complimented their taught lessons to develop their knowledge, communication, mathematical and problem-solving skills as stated by the pupils in the data.

8.8.2 Findings to suggest answers to research question four

Q4. Perceptions and reactions: what are users' attitudes to CLP?

The study established that there was a difference in the perceptions of the two-year groups based on their previous educational experiences through teaching and learning. Y7 pupils seemed excited and had no issues with possible new ways of being taught. However, the Y12 pupils were concerned that the CLP was going to mean a completely new way of learning focused on an ICT approach that they were hesitant towards. There was also some hesitation and resistance to change from teachers with their own understandable reasons and questions whether the use of the CLP would improve on more traditional methods.

Despite the concerns of the Y12, both those pupils and the Y7 pupils that participated in the interview stage were all able to engage with the CLP and try this new approach to CL. The widespread reactions from pupils to the CLP was positive, with pupils in both year groups stating they felt they had developed skills, knowledge or perceived improvement from using the CLP. There were beliefs to the contrary with some pupils in both year groups believing the CLP was not beneficial and that they preferred more traditional non-collaborative approaches to learning. The data from pupils using the CLP demonstrated further varying levels of confidence; it was suggested that these levels could be affected by perceived positive or negative engagement with other pupils.

8.8.3 Findings to suggest answers to research question five

Q5. What are the professional implications of this?

The first set of professional implications reflect the perceptions and reactions of teachers to the idea of introducing new teaching and learning approaches including the CLP and CL. The responses from teachers demonstrated teacher hesitation towards a change in teaching and learning methods that was agreed with by some pupils. However, two teachers did at times display an openness and said that they would consider trialling the use of the CLP used in this study with their physics classes. Teacher four vehemently opposed the idea of change, as he stated he loved his traditional approach to teaching. Due to his thirty plus years of experience he clearly felt that unless there were concrete evidence he did not want to move away from his current methods.

The findings did suggest that the CLP was effective in developing pupils' skills and developing understanding in the physics topics covered in the conditions it was used in within the study in the case school. Therefore, it would be worth considering the use of a CLP across the rest of the Y7 and Y12 physics curriculum to gain further evidence and research towards finding out how it may aid or support learning. However, in order to further clarify this, a recommendation would be to trial the CLP with several classes or across different subjects to see whether the findings of this study are repeated and able to be generalised.

Chapter Nine: Conclusion and Recommendations

9.1 Chapter outline

This chapter brings together the findings from the literature and policy review (Chapter 2) along with the data from the online questionnaires and interviews as explored in Chapter 7 and 8 that builds judgements to offer recommendations and conclusions to the research questions.

This research set out to investigate and answer the following research questions:

1. What is meant by 'collaborative learning platforms (CLP)' as a notion in an English school?
2. Why is innovation in teaching around the use of ICT being encouraged as an innovative policy in the case school?
3. What are the uses of CLP as a teaching tool in the case school?
4. Perceptions and reactions: what are users' attitudes to CLP?
5. What are the professional implications of this?

9.2 Answering the research questions

9.2.1 Research question 1

Q1. What is meant by ‘collaborative learning platforms (CLP)’ as a notion in an English school?

A CLP has been defined from this study as an online virtual learning environment equipped with a range of learning activities that aids pupils in the following two ways: by offering materials that build on the content covered in class through dynamic resources and by providing an environment in which scaffolded CL can take place. This definition was constructed from the literature review using the principles that linked CL, the theories behind CL and the uses of ICT within the school curriculum as set out in Chapter 2 with the definition given in section 2.5.3.

The literature review was able to demonstrate what was meant by the term CL, drawing on the works of Gokhale (1995), Panitz (1999) and Chen and Chuang (2003), with these authors drawing on the idea of social interaction through a group of people working together to enable more developed learning. Through these concepts of working together, pupils can share knowledge to achieve a common goal or produce new knowledge. This concept of a goal was explained by Laal and Ghodsi (2012) as solving a problem, completing a task, or creating a product by learners working together.

The idea of sharing knowledge through working together stemmed from Vygotsky (1978) and Bruner’s (1978) social constructivism theories explaining how cognitive development is highly dependent on social interactions. Through social interaction, sharing knowledge allows learners to understand and build new knowledge. This is said to be at its most effective when knowledge creation is supported by a collaborative discourse (Prawat and Floden, 1994). Changing this from a teacher-led perspective to

one where the learners become active in constructing knowledge through social interactions allows for learners to learn through CL. Although this contrasts with the current governments policy (DfE, 2013) that whilst it looks to develop learners' skills is based on an ideological position of teacher led learning (Gove, 2013). Gokhale (1995), Krischner *et al.* (2004) and Chen and Chuang (2003) argue that not only does the learning of the group improve but also the learning skills they possess through using CL. The suggestions from the data collected through the questionnaires and interviews presented evidence that some in both Y7 and Y12 pupils had a good appreciation of the term CL. This was demonstrated through their explanations that reflected the key terms such as sharing knowledge, working collaboratively and developing skills, as seen in the literature definitions of Gokhale (1995), Panitz (1999) and Chen and Chuang (2003).

A significant finding, and an area of potential new knowledge within the context of the study, was how several Y7 pupils perceived CL as an approach that involved simply copying work or cheating. This was seen from patterns in the data across both data gathering methods, with seven out of eighteen Y7 pupils in the questionnaire and five out of the eight in the interviews holding this perception. The processes of how Y7 pupils used CL did not match the discussions, definitions and explanations of CL in Literature. When comparing the Y7 responses from the questionnaire to those taken in the interviews it was suggested that some Y7 pupils did develop a better understanding towards using CL. I felt that at the start of the research there was a lack of understanding in the Y7's approach to CL as they may not have encountered CL before as a way of learning. In contrast several the Y12 did have a familiarity with CL as they explained this was due to the case school's study skills programme and as teacher questioned in the study explained CL was used more in Y11 to 13.

Although, Y12 did not state or link the practice of cheating or copying to CL it was identified that some Y12 along with Y7 pupils were carrying out a process of sharing answers and work using ICT and social media messaging. This highlighted a further potential of new knowledge that demonstrated how in a technological society, pupils were making use of ICT to share knowledge. Indeed, this may reflect an idea of situational ethics where pupils believe sharing answers is not copying or cheating in their minds, however, a teacher may hold a different contrasting view to this.

Section 2.6.6 in the literature review investigated this approach demonstrating research from Holub (2008) and Goldstein (2014) that identified the practice of pupils sharing work using ICT and through social media. Indeed, this echoed findings from Rambe's (2012) research where pupils sent answers directly to each other rather than constructing them collaboratively. This suggested that there could be a more widespread problem with pupils using ICT to share work (Goldstein, 2014) as there now is now an increased reliance on ICT in education (Sections 2.5 and 2.6). Goldstein (2014) goes further to suggest that this may even be encouraged within some educational settings. In my research the pupils' responses to interview question 2e, analysed in section 8.2.4 significantly demonstrated this practice of sharing work was taking place across both year groups. With further investigation it would be interesting to see if this practice is widespread across pupils in all year groups within all subjects and whether this practice allows for the development of skills through discussion or whether it is just a case of copying another pupil's work.

The CLP allowed pupils who engaged with it to access resources and an online collaborative area where they could work together in order to complete tasks that were planned to aid their learning. Feedback and subsequent data analysis in section 8.3.1.2 suggested pupils across both year groups were able to engage and some

pupils stated they felt they had developed skills or improved understanding of the physics topics covered in the study. Some pupils demonstrated a hesitancy towards using CL (section 8.3.1); four pupils - two in each year group - offered clear reasons for not wanting to engage in CL through the interviews. The two Y12 pupils explained this came from their backgrounds and previous education as they were new to the school and preferred to work on their own. The two Y7 pupils were honest and stated that they did not like working with others (section 8.3.1.3) and felt it led to distracting them from their work this was back up by Y12 responses. Indeed, this finding reflected Lee *et al.*'s, (2014) suggestion in literature highlighting the concerns raised by pupils using CL and reasons why they preferred not engage in the process.

An important part of the CLP was the use of ICT to facilitate pupils' engagement through social interactions online, allowing them to work together and access the learning resources. Rutherford (2016) suggests that incorporating ICT as a supportive structure aiding CL offers potential benefits. Smeets (2005) further elaborates explaining that ICT and mobile technologies can bring learners together, allowing them to share knowledge by acting as a facilitator to learning and the development of higher order thinking skills. As set out in the data and explained in the analysis (section 8.3.2), some pupils did mention how they believed they had developed these skills; for examples Y12 pupils spoke of developing analytical and problem-solving skills and Y7 explained how they had improved their mathematical skills. Indeed, the background questionnaire at the start of the research found and suggested that pupils were using ICT and social media to work collaboratively to complete homework. This suggests that pupils did engage with the resources, making use of the CLP that in the views of some pupils did allow for improvement in skills and understanding. In turn this reflects the Issroff and Scanlon (2002), Rambe (2012) and Swann's (2013) research findings

that suggested online learning environments can promote student interactions, share knowledge and allow an improvement in knowledge.

The research from this study and the three studies detailed above help to clarify the definition and notion of a CLP within the setting of an English school as set out in Chapter 2, section 2.5.5. A CLP has been defined as a form of online learning environment equipped with a range of different learning activities that will aid pupils' learning through dynamic resources that provide an environment in which scaffolded CL can take place between pupils.

9.2.1.1 Recommendations and findings from research question 1

1. Adoption of the definition of CLP from this research.

2a. Schools should investigate pupils' responses to CLP to design effective online teaching practices.

2b. Consideration for a study to determine how pupils are using ICT, mobile devices and social media to share work as seen in the case school.

9.2.2 Research question 2

Q2. Why is innovation using ICT being encouraged as policy in the case school?

The policy review element of the literature review was able to demonstrate how the school's academic curriculum policy had been driven through changes in national and global education policies. The idea of innovation in teaching and learning dates to the first formal introduction of ICT in the *Education Act* of 1988 (DfES, 1988). Since the inception of ICT into the curriculum subsequent governments have changed the focus of the curriculum based on ideological stances their beliefs as to what would best benefit pupils. This was demonstrated with the move towards a skills-based curriculum with Labour's *Curriculum 2000* (DFEE) followed by a move back towards a curriculum prioritising knowledge of pupils with the Conservatives *National Curriculum 2014* (DfE, 2013).

Current Schools Minister, Nick Gibb, emphasised the importance of a knowledge-based curriculum through his speech (Gibb, 2015), outlining the reason for this change however, he did highlight the need for innovation in learning and the development of pupils' digital skills. This need to innovate remains at the forefront of global education research as highlighted in the *Measuring Innovation in Education* (OECD, 2016) suggesting how innovation in education leads to high skill workers capable of driving economic competitiveness. This echoes the sentiments of the 1988 Education Act (DfES, 1988) to introduce computing with the aim of developing pupils' skills fit for further education or the future workplace.

Over the last thirty years the nature of teaching and learning has changed through several curriculum reviews (section 2.3.2) and due to globalisation where the Government chose to adopt ideas from other countries, for example from the *PISA*

Study (OECD, 2014) and *Measuring Innovation in Education* report (OECD, 2016). These reports have allowed governments world-wide to adopt different approaches from other countries where the reports have deemed these approaches a success, having had a positive influence on the education of pupils. It is these reports and the reviews conducted by global organisations such as the OECD (2016) and the WBG (2018) that have led to this drive to innovate in education.

This research has in turn driven the direction of the Government when designing the national curriculum that filters down into schools such as the case school by driving its adoption of certain policies. These ideas are reflected in the school's Academic Curriculum Policy setting a goal of innovating through the use of ICT and new technologies with the aim that these innovations will benefit pupils and inspire teachers. However, despite the perceived ideas of benefits and inspiration, some ideas of hesitancy were displayed through the teacher and pupil interviews later in the study which may merit a call towards blended learning. As Bogan and Ogles (2016) set out, blended learning sees a combination of traditional methods with newer innovative methods including ICT and CL, which may appease teachers and pupils alike. As set out in Chapter 2, section 2.2, innovation means new practices that 'improve the provision of education in one way or another' (OECD 2016 p.23) that include or incorporate the digital skills and study skills such as CL as practices that can positively improve educational provision.

9.2.2.1 Recommendations and findings from research Q2

3. Revise educational provision for online learning to clearly set out a definition of a CLP.

4. Define clear criteria for effective CLP with steps for designing CLP to meet these criteria, leading to implications of importance of online resources and teacher training.

9.2.3 Research question 3

Q3. What are the uses of CLP as a teaching tool in the case school?

The CLP was designed to facilitate learning through combining ICT with CL to create an online platform that allowed pupils in the case school to work collaboratively with the goal of allowing them to complete assigned tasks. This concept was possible due to the advances over the past ten years in ICT, mobile devices and the internet that Reich *et al.* (2014) explain have been transformative in education allowing, as Chen *et al.*'s (2008) research demonstrates, pupils to learn from almost anywhere they want. Indeed, combining more traditional teaching methods with the CLP, I formed a teaching approach referred to as blended learning, described by Bogan and Ogles (2016) as explored in the literature review. Rambe (2012) demonstrated the possibilities that existed when using this approach, through using a social media platform to support learning by encouraging pupils to work together to complete assignments through sharing ideas and knowledge. The idea of trying to innovate in my own teaching led me to investigate how I could produce a framework through the use of an online environment to allow pupils to work collaboratively helping each other to learn.

The CLP was used to capitalise and build on the fact that the initial questionnaire demonstrated pupils did work together using ICT and social media with their peers alongside the more traditional ideas of CL through social interaction face to face. The data from the interviews suggested that some pupils using the CLP felt it allowed them to work collaboratively with others. In total eleven out of fifteen pupils expressed these perceptions, and who also stated they believed it had enabled them to develop skills such as: communication, problem solving and mathematical skills (section 5.4.3). This data may be able to demonstrate new knowledge that shows a CLP can be used to

aid learning, develop knowledge and the skills of some pupils within the context and processes used in the case school in this research study. The data suggests similar outcomes to research (for example Issroff and Scanlon, 2002 and Rambe, 2012) demonstrated in the literature review that using a VLE or social media platforms incorporating ICT can be used to aid learning, in particular in tertiary education.

As outlined, there were some pupils who did not value the use of the CLP, as explained from their perceptions (section 8.3.3) that it did aid learning, they preferred working alone or they felt they did not learn when using ICT. One teacher also held a similar point of view due to his fondness of a traditional approach to teaching. Over the course of the study using CLP and more exposure to the school curriculum and study skills programme, the Y7 pupils' understanding and explanations of a CL approach developed. This was suggested by the change in their explanations of CL as they moved towards those found in CL literature from Gokhale (1995), Panitz (1999) and Chen and Chuang (2003).

9.2.3.1 Recommendations and findings from research Q3

5. Testing of CLP across schools to establish whether these can be adopted into educational practice to improve performance.

6. Extend the use of CLP and further refinement of tasks or exercises used in the CLP to develop particular knowledge or skills (e.g. numeracy).

9.2.4 Research Q4 and Q5

Q4. Perceptions and reactions: what are users' attitudes to CLP?

Q5. What are the professional implications of this?

The recommendations for research questions 4 and 5 are discussed together as the perceptions and reactions directly inform and link to the professional implications within this case. A total of thirty-two pupils from Y7 and Y12 took part in the online questionnaire at the beginning of the study with eight Y7 and seven Y12 taking part in the interviews later in the study.

The preconceptions around using the CLP varied between the Y7 positive approaches which contrasted to the Y12 apparent concerns and hesitancy to a change away from more traditional teaching methods. However, the initial hesitancy from the Y12 pupils seemed to disappear and significantly all pupils (in both years) who took part in the interviews stated that they had made use of the CLP, trying at least one activity and using the collaborative area where they could work together. This was demonstrated by eleven out of fifteen pupils stating positive perceptions and reactions to the use of the CLP. I felt this was significant as it offered justification to the experimental approach trialled in this research whilst offering areas to consider for professional development.

Stake (2005) placed an importance on rich qualitative data informing a case study. I therefore did not just seek the positive reaction towards the CLP from the pupils but also wanted to gain meaning from the data collected that would meet his criteria. The data collected satisfied criteria in Spencer *et al.* (2016) for being rich as it contained personal opinions that gave explanations backed up by details explaining how or why this was the perception or reaction of the pupils. This rich data provided the statements

where Y7 pupils expressed the development of their understanding towards CL and were able to demonstrate this through their interview data, with a majority (six out of eight) stating how they felt the CLP had helped to improve their knowledge or skills. The Y12 data agreed with the Y7 data, as five out of seven pupils stating that they had made use of the CLP resources and expressed perceptions that the CLP had helped to improve knowledge and skills. This suggested the CLP could be a successful learning tool, allowing pupils to learn in a collaborative manner as Rambe's (2012) research demonstrated through the use of a virtual learning environment in tertiary education.

As the questionnaire and interviews suggested, pupils still had concerns over working with others collaboratively that could be barriers to using the CLP. Again, these stemmed from distractions that Rutherford *et al.* (2016) argue are the leading cause of concerns in CL and anxieties that pupils feel towards making mistakes or getting questions wrong. Despite some concerns or hesitation towards CL, pupils did try using the CLP and this enabled constructive feedback that could allow further developments to the CLP in the future.

Pupils explained that it sometimes took time to find a resource, or the resource was not as helpful as it could be, or that the collaboration area contained material that was nothing to do with the work that was being carried out. Teachers too contributed to feeding back on the idea of the CLP raising the issue of time required to learn how to use it effectively and the time it would take to monitor and prepare resources. It emerged that these issues could prevent or act as barriers to pupils or teachers using the CLP, indeed reflecting ideas suggested by McKinsey (1997) and Ofsted (2012.a and 2012.b) that prevent ICT being adopted in the curriculum. This provides

considerations for the future design of CLP and training in using CLP that form recommendations stated below in section 9.2.4.1.

A further barrier to the possible use of a CLP within the case school was the suggested teacher hesitancy. This was explored through the interviews and suggested that a possible change to an unproven method of teaching and learning could cause disruption to pupils' learning. Although the hesitancy echoed with the ideas of resistance to change (Richardson, 1998), teachers did state clear reasons based around training, time and pupils' outcomes as factors for their hesitation to adopt a new approach. Therefore, as discussed earlier in the research, perhaps blended learning could offer an intermediate step allowing the assurances of current traditional approaches with newer innovations. Richardson (1998) and Williams (2016) do go on to describe how reluctance to change or hesitancy in education can be overcome through trials and evidence showing how the implantation of a new initiative can be used to improve learning. Significantly, after discussions and the interviews three of the teachers did suggest towards the end of the interviews that they would be prepared to trial the CLP after discussion.

9.2.4.1 Recommendations and findings from research Q4

7. Investment into ICT hardware, software and pupil training to ensure pupils can access and make use of CLP to aid learning.

8a. Greater use of CLP to make the platform more familiar to pupils and therefore low risk when using helping to reduce anxiety.

b. Teacher training to scaffold learning using the CLP, hence ensuring more widespread use of CLP in teaching and learning.

c. Government investment in training to build/write CLP and online resources designed to populate the CLP.

9.2.4.2 Recommendations and findings from research Q5

9. Time for teacher training to ensure all teachers have the necessary skills to use ICT and create resources.

10. Schools need to highlight the importance of sharing good practice between teachers, including sharing resources and online teaching techniques.

9.3 Limitations of the study

Lewis *et al.* (2014) explain that reliability and validity of the data are key contributors to whether research may be generalised; indeed Seale (2011) suggested that any research is only as good as the quality of the data based on these two factors. Gibbs (2007), Cohen (2011) and Spencer *et al.* (2016) refer to the reliability and validity of the data in order to explain how actions have mitigated drawbacks and reduced limitations.

Scaife (2009) explains that validity and reliability enable a researcher to gain the trust and confidence of a reader in a piece of research they have written. Walliman and Buckler (2011: 207) define validity as

‘The accuracy of a result, whether the collected data is representative and illustrates the phenomenon.’

Lewis *et al.* (2016) explain reliability as how repeatable the findings of the study would be if completed in another setting using the same methods. The first steps I took to ensure reliability were to follow O’Leary’s (2010) structure of logical, methodical, systematic and well documented methods to gather the data. As set out in Chapter 4, research design and methods and Chapter 5, research ethics, careful consideration was given to the participants involved in the study, and pupils were offered the opportunity to take part in the study. When data was collected it was treated carefully, kept securely and the transcription of data was carefully checked to ensure accuracy (Lewis *et al.*, 2014). Through the analysis process checks were performed to ensure consistency through coding to prevent definitional drifting (Gibbs, 2007) that can occur between data coded over a period of time.

Gibbs (2007) sets out validity as the precision of the researcher reporting on the data to ensure it is an accurate reflection from the participants in the sample. This resonates

with Cohen *et al.*'s (2011) explanation of descriptive validity to ensure factual accuracy of the account. I took the approach outlined by Gibbs (2007) and Seale (2011) to address this through using quotations and responses to evidence suggestions, recommendations and findings. I was also careful to consider interview bias and the bias and power discussed through insider research. A final consideration relating to validity is how the evidence demonstrates that the research is grounded in the data; this again called for the use of quotations and statements from pupils when setting out claims.

Lewis *et al.* (2014) list representational and inferential generalisation as two distinct ways to assess the relevance of the research between settings. With Stake (2005) providing direct contradiction as to whether case study can be or cannot be used to infer generalisability care needs to be taken. As set out in section 3.3.4.2 I was not seeking to generalise from this study to others as I had set this study with the bounded case of the school. The data samples represented two-year groups within the school and based on the commonality and reoccurrence of themes. The Y7 data conforms with Lewis *et al.*'s (2014) notion of representational generalisation: that the sample reflects that of the parent group, that the findings would be representative across that year group within the case school.

However, regarding the Y12 data this could be representative of the Y12 cohort who study Physics A-level but not the year group as a whole. This is due to the fact these pupils chose to study A-level Physics, as well as to the different demographic this group would have, including gender split and academic background to the year group as a whole. Therefore, I feel that a large sample using the CLP across different subjects would be required to test the findings from the Y12 pupils to be able to say that they were representational across the Y12 and indeed across the school.

Lewis *et al.*'s (2014) explanation of inferential generalisation allows for an argument to determine whether findings could be generalised or inferred to another setting. Therefore, I feel as set out in research recommendation 5 (section 9.2.3.1) that further research to test the CLP in different schools would be required. To infer the findings of this case study I believe it would require the setting to have a similar academic curriculum policy and take on innovation. There could be general findings of this if the CLP were used and may aid learning that could be transferable to another setting, but in order to use the CLP as it was here would require similar policy and practices to be in place. However, the findings and recommendations from this study would be able to provide guidance on the design of a CLP and possible applications using innovations in teaching and learning.

9.4 Own learning and further research recommendations

Through this study, I have been on my own learning journey where I have considered my approaches to teaching and learning in addition to my motivations for what I do, and why I do it. The positionality of Johns' (2009) reflective practitioner resonated with how applying critical analysis to investigating a new practice I could consider the possible changes that could benefit my future pupils.

Indeed, the process of a qualitative data analysis case study was daunting, as I moved away from a more familiar background of scientific inquiry where repeatable experimentation yields data, which is then analysed to allow the confirmation or rejection of a hypothesis. Whereas the qualitative nature of this research had me questioning participants through interactions and discussions, trying to tease out information. I hoped this data might allow an insight into their own opinions that could possibly give helpful information of value towards my study. I was fortunate that throughout the study I felt I was able to gain an understanding and appreciation of the experiences and perceptions of pupils and teachers; these gave me a better understanding of their situation and indeed my own as a teacher. This also suggested the benefits of, and barriers to, the use of the CLP intervention that I had designed helping to inform the recommendations discussed through this chapter.

I felt that there was evidence through the study that the confidence of some pupils and teachers changed towards the suggestion of the CLP as a new approach to teaching and learning. I also felt that my own ideas and perceptions as to how - or indeed at times whether - it could be used changed through the different parts of the study and especially the writing of the thesis. I found myself on occasions doubting the very nature of what I was doing. However, with the guidance and assurance of my tutors I have managed to be working during a possible watershed moment in education as it

globally (OECD, 2016), nationally (DfE, 2013) and locally (School ACP, 2018) evolves. This is suggested through the incorporation of an array of new and exciting technologies, as Gove (2014) and Gibb (2014) set out, and through the incorporation of innovation to excite the case school's traditional curriculum into a modern one. This, although not a new idea, builds on the move towards a blended learning approach combining in my view the best of both worlds. This takes the more traditional teacher led approaches to learning and combines them with the possibilities of ICT and mobile technologies that can move the classroom to almost anywhere as Traxler (2013) explains.

The question remains whether ICT will ever truly be adopted into every lesson; in my view, from the literature I have reviewed there is scope for its use to support learning but only if the resources, skills and training are in place. Indeed, my research has, I believe, provided new knowledge of the possibilities a digital approach using a CLP offers in a secondary school. Through dissemination I hope to provide an insight into the research that I carried out, demonstrating the potential barriers and benefits to this approach, as well as being able to guide fellow professionals in how to combine traditional and digital curricula. This personal journey along with the research has enabled the formations of the following recommendation listed below (section 9.5) that I believe add new knowledge and professional implications to effectively using ICT in education.

9.5 Research recommendations

Table 9.5a below displays the research recommendation from the study as detailed through the sections above in Chapter 9. These have been linked to the research questions (RQ) as set out in section 1.5, along with an action level that explains the level at which the recommendations need to be implemented.

Figure 9.5a Table to display research recommendation from the study

Num	Recommendation	Action level	RQ	Research findings
1	Adoption of the definition of CLP from this research.	National and school	1	The study was able to provide a definition to the notion of a CLP within the setting of an English school as set out in Chapter 2, section 2.5.5. A CLP has been defined as a VLE equipped with a range of different learning activities that will aid pupils' learning through dynamic resources that provide an environment in which scaffolded CL can take place between pupils.
2	a. Schools should investigate pupils' responses to CLP to design effective online teaching practices. b. Consideration for a study to determine how pupils are using ICT, mobile devices and social media to share work as seen in the case school.	National and school	1	Further research in another setting, this could be another subject or another school to explore the introduction of a CLP to investigate different perspectives towards the use of a CLP. Further research could also determine how pupils are making use of ICT, mobile devices and social media in secondary schools. This could seek to determine if they are being used as was found in the case school and whether they could be used in line with or as a CLP to aid learning.
3	Revise educational provision for online learning to clearly set out a definition of a CLP.	National	2	Although the Government will continue to set educational policy the school in its position as an independent school has the privilege of choosing how to put this into its own policy. Therefore, the school needs to consider the ramifications of continual policy change. As this may affect the learning outcomes of pupils and the morale of staff due to changing methods of delivery and the requirements to learn new skills and invest significant time to training and developing resources.

4	Define clear criteria for effective CLP with steps for designing CLP to meet these criteria, leading to implications of importance of online resources and teacher training.	National and School	2	
5	Testing of CLP across schools to establish whether these can be adopted into educational practice to improve performance.	School	3	Data suggested that the CLP had merit as a teaching tool as some (eleven out of fifteen) pupils interviewed reported perceptions of the CLP aiding learning, improvements to knowledge and development of skills.
6	Extend the use of CLP and further refinement of tasks or exercises used in the CLP to develop particular knowledge or skills (e.g. numeracy).	National	3	
7	Investment into ICT hardware, software and pupil training to ensure pupils can access and make use of CLP to aid learning.	National and school	4	Potential benefits of the use of the CLP demonstrated through pupils' perceptions that explained how pupils felt they made improvement using the CLP.
8	a. Greater use of CLP to make the platform more familiar to pupils and therefore low risk when using helping to reduce anxiety. b. Teacher training to scaffold learning using the CLP, hence ensuring more widespread use of CLP in teaching and learning. c. Government investment in training to build/write CLP and online resources designed to populate the CLP.	National and school	4	Potential barriers for using the CLP were identified in pupil and teacher perceptions highlighting anxiety, confidence and hesitancy to adopt new, different or unproven approaches in teaching and learning.
9	Time for teacher training to ensure all teachers have the necessary skills to use ICT and create resources.	School	5	Consideration of the professional implication of incorporating innovation into teaching practice and how this is delivered in CPD (Further discussed in section 9.5)
10	Schools need to highlight the importance of sharing good practice between teachers, including sharing resources and online teaching techniques.	School	5	

9.6 Conclusion

Simply handing out a computer, mobile device or tablet is not going to improve education, pupils' learning or the skills they have, as this research and literature demonstrated. Research from Issroff and Scanlon (2002), Rambe (2012) and Swann's (2013) has demonstrated how instructions from teachers and a supportive framework are required to ensure pupils are confident and capable in using new innovative learning approaches such as the use of the CLP. However, with the demand locally, nationally and globally to innovate within education, an approach that can consider ICT, new technologies and learning skills being championed (OECD, 2016) needs to be found. This approach must ease both pupil and teacher anxieties, concerns and hesitation in moving away from traditional face-to-face learning approaches (Plevin, 2017) - all factors that contributed to negative perceptions and reactions in this study.

By mitigating these issues through trialling new approaches to teaching and learning, in evidence-based studies, teachers and pupils may be more open to innovations, perhaps, first using the intermediate step of blended learning before adopting truly innovative approaches. However, as I have discovered in my research, not all pupils and teachers are prepared for this, with several each still highly valuing a traditional curriculum, meaning that it is likely that it will be decided by local or national policy how a curriculum may look rather than by an individual teacher.

The use of the CLP has suggested the possible barriers and benefits that existed when the CLP was used in the case school. The pupils' perceptions and reactions have suggested that ICT can be combined with CL to enable pupils to engage with an innovative practice, such as a CLP. Indeed, some pupils suggested through their perceptions that the CLP had allowed them to further develop their skills and subject

knowledge. Dissemination from this research along with further evidence-based studies could help support the findings of this study, enabling a culture of innovation through the inclusion of Collaborative Learning Platforms in the case study school.

9.7 Closing statement

The research set out through five research questions to investigate the benefits and barriers through exploring innovations in CLP use within the case school. Using these five questions I have been able to collect, interpret and analyse data from a range of pupils and teachers to present the recommendations and findings set out above. Through this research I believe that I have been able to demonstrate benefits and barriers that exist along with deepening my own understanding and practice around innovative learning approaches.

As suggested, an unexpected finding in the research was what appears to be the widespread practice of pupils working together using ICT in Y7 and Y12 to complete work outside of lessons. Although it seems more likely from the data that this the exchange of answers rather than building knowledge collaboratively, it demonstrates how ICT and mobile technology are being used. I would hope that with some guidance or the further use of CLP this practice could be developed into working together rather than just sharing answers.

A further idea that the study raises is how the Y7 pupils might develop. This was not designed as a longitudinal study but in the future a follow-up study to see how the current Y7 progress through the school would be interesting. If the school maintains the same curriculum over the next five years it would be interesting to see how they develop their approaches to learning skills when they are in Y12.

As education continues to evolve it will be up to practitioners like me to try and build on the more traditional methods of teaching by innovating to use the adaptation of new and latest technologies, ICT and mobile learning. Education continues to change by promoting different pedagogies, innovative curriculums and new digital teaching and

learning methods. However, the focus must never shift from the pupils' education and their learning outcomes.

9.8 Afterword

At the 11th hour as I worked to complete my thesis the terrible Covid-19 pandemic struck. Following the outbreak, and subsequent closure of schools, there was a sudden need and demand for the delivery of curricula through online learning. Indeed, some schools like my own were well placed and with a few early teething problems managed swiftly to move to online lessons. Other schools were in less fortunate positions and were not able to offer the breadth and depth of courses, resources and support to pupils. Currently, it seems that the ideas of online learning are more pertinent than ever. My thoughts are with those who lost loved ones but in the field of education I expect one outcome from this pandemic will be the argument to expand the possibilities of online learning.

References

- Altheide, D. L. and Johnson, J. M. (2011) Reflections on interpretive adequacy in qualitative research. In: Denzin, N. K. and Lincoln Y. S. eds., (2011) *The SAGE handbook of qualitative research*. California: SAGE. pp. 581-594
- Anderson, G. L. and Jones, F. (2000) Knowledge generation in educational administration from the inside out: the promise and perils of site-based, administrator research, *Educational Administration Quarterly*. 36 (3), pp 428–464.
- Angrosino, M. (2007) *Doing Ethnographic and Observational Research*. London: SAGE
- Annan-Coultas, D. (2012) Laptops as Instructional Tools: Students Perceptions. *TechTrends*. [online] 56. (5), pp 34-41. Available from: <http://link.springer.com/article/10.1007%2Fs11528-012-0596-y> [Accessed 12 August 2014]
- Ashman, G. (2019) eds. In Boxer, A. (2019) *The researchED Guide to Explicit & Direct Instruction: An evidence-informed guide for teachers* London: John Catt Education
- Ball, S. J., Maguire, M. and Braun, A. (2012) *How Schools Do Policy: Policy Enactments in Secondary Schools*. London: Routledge
- Bartlett, S. and Burton, D. M. (2012) *Introduction to Education Studies*. London Sage
- Bates, T. (1993) Theory and practice in the use of technology in distance education. In: Keegan, D. (1993) *Theoretical Principles of Distance Education*. Oxford: Routledge, pp. 213-243
- Beatbullying (2012) Cyberbullying report. [online]. London: *Beatbullying*. Available from: <http://archive.beatbullying.org/index.html> [Accessed 3 July 2015]
- Beatty, K. (2013). Beyond the classroom: Mobile learning the wider world. Monterey CA: *The International Research Foundation for English Language Education*. [online] Available form: <http://www.tirfonline.org/english-in-the-workforce/mobile-assisted-language-learning/> [Accessed 12 August 2015]
- Bell, L. and Stevenson, H. (2006) *Education policy: process, themes and impact. Leadership for learning*. London: Routledge.
- Bell, L. and Stevenson, H. (2006) *Education policy: process, themes and impact*. London: Routledge
- Bernstein, B. (2001) From Pedagogies to Knowledge. In: Morais, A., Neves, I., Davies, B. and H. Daniels., eds. *Towards a sociology of pedagogy*. New York: Peter Lang. pp. 363-368.
- Bindin, S. and Ziden, A. A. (2012) Adoption and application of mobile learning in the education industry *Procedia. Social and Behavioural Sciences*. 90, pp. 720–729.
- Black, I. (2006). The presentation of interpretivist research. *Qualitative Market Research: An International Journal*. [online]. 9, pp. 319–324. [Accessed 28 June 2019]
- Black, K. (2010) *Business Statistics: Contemporary Decision Making*. London: John Wiley & Sons
- Bloom, B.S., Engelhart, M.D., Furst, E.J., Hill, W.H., Krathwohl, D.R. (1956). *Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain*. New York: David McKay Co Inc.
- Bogan, B. and Ogles, M. (2016). *Blended Learning: A Concise Guide for Mixing Technology with Instruction in all Classrooms*. London: UC Publishing
- Borko, H., Whitcomb, J. and Liston, D. (2009) Wicked problems and Other Thoughts on Issues of Technology and Teacher Learning. *Journal of Teacher Education* [online] 60. (3), pp. 3-7. [Accessed 14 July 2014] Boston: Kluwer Academic. pp. 3–30.

- Bourgonjon, J., Valcke, M., Soetaert, R. and Schellens, T. (2010) Students' perceptions about the use of video games in the classroom. *Computers & Education*. [online]. 54, pp. 1145–1156. [Accessed 2 June 2017]
- Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*. London: Sage Publications, Inc.
- Braun, V. and Clarke, V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology* [online], 3 (2). pp. 77-101. Accessed May 12 2017
- British Educational Research Association (BERA) (2016) *The BERA Charter For Research Staff in Education*. [online] Available from: <http://content.yudu.com/Library/A1x18j/BERACharter/resources/index.htm?referrerUrl=http%25253A%25252F%25252Ffree.yudu.com%25252Fitem%25252Fdetails%25252F555782%25252FBERA-Charter> [Accessed on 10 July 2015]
- Brooks, J. and King, N. (2014) *Doing Template Analysis: Evaluating an End-of-Life Care Service*. In: *SAGE Research Methods Cases*. London: SAGE.
- Brooks, J., McCluskey, S., King, N. and Burton, A.K. (2013). Illness perceptions in the context of differing work participation outcomes: exploring the influence of significant others in persistent back pain. *BMC Musculoskeletal Disorders*, 14.
- Bruner, J. (2009) *The Process of Education, Revised Edition*. New York: Harvard University Press.
- Bruner, J. S. (1978). The role of dialogue in language acquisition. In A. Sinclair, R., J. Jarvella, and W. J.M. Levelt (eds.) *The Child's Concept of Language*. New York: Springer-Verlag.
- Brydon-Miller, M., Greenwood, D. and Maguire, P. (2003). Why action research?. *Action Research* [online] 1 (1), pp 9-28. [Accessed 23 July 2015]
- Bryman, Alan (2004). *Social research methods* (2nd ed.). New York: Oxford University Press.
- Burgess, R. G. (1995) *Computing and Qualitative Research*. London: JAI Press
- Campbell, D. T., & Stanley, J. C. (1963). Experimental and quasi-experimental designs for research on teaching. In N. L. Gage (Ed.), *Handbook of research on teaching* (pp. 171–246). Chicago, IL: Rand McNally.
- Carr, J. (2012) Does Math Achievement h'APP'en when iPads and Game-Based Learning are Incorporated into Fifth-Grade Mathematics Instruction?. *Journal of Information Technology Education: Research* [online]. 11, 269-286. [Accessed May 22 2017]
- Carson, D., Gilmore, A., Perry, C., and Gronhaug, K. (2001). *Qualitative Marketing Research*. London: Sage.
- Chang, K-U., Sung, Y-T. and Liu, T-C. (2014) The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers and Education*. [online]. 94, pp. 252-275 [Accessed 12 August 2017]
- Charmaz, K. (2002). Qualitative interviewing and grounded theory analysis. In J. F. Gubrium & J. A. Holstein (Eds.), *Handbook of Interview Research: Context & Method* (pp. 675-694). Thousand Oaks, CA: Sage.
- Chen, W., Yew Lee Tan, N., Looi., Zhang, B. and Sen Kee Seow, P. (2008) Handheld Computers as Cognitive Tools: Technology-Enhanced Environmental Learning. *Research and Practice in Technology Enhanced Learning*, [online] 3, (3) pp. 231–252. [Accessed August 3 2015]
- Chen, W.F. and Chuang, C.P. (2003). Computer-Assisted Collaborative Learning for Young Children: An Quantitative Study. In: Crawford, C. Davis, N., Price, J. Weber, R. and Willis, D. Eds., (2003) *Society for Information Technology & Teacher Education International*. [online] 1. pp. 3258-3261. [Accessed 20 August 2017]

- Childs, M. and Peachey, A. (2013) Love it or hate it: Students' responses to the experience of virtual worlds in M. Childs and G. Withnail. eds., (2013) *Experiential Learning in Virtual Worlds*, [Kindle] Oxford: Interdisciplinary [no pages]
- Childs, M., Schnieders, L., and Williams, G. (2012) "This above all: to thine own self be true": ethical considerations and risks in conducting Higher Education learning activities in the virtual world *Second Life. Interactive Learning Environments*. 20, pp. 253-269
- Cho, M. and Reinders, H. (2010). Extensive listening practice and input enhancement using mobile phones: Encouraging out-of-class learning with mobile phones. *The Electronic Journal for English as a Second Language*. [online] 14. (2), 1–7. [Accessed 17 July 2015]
- Christodoulou, D. (2014) *Seven Myths About Education*. New York: Routledge
- Chun, D. and Tsui, E. (2010) A reflection of the state of mobile learning in Asia and a conceptual framework. *IADIS International Conference Mobile Learning*. [online] Available from: <http://repository.lib.polyu.edu.hk/jspui/bitstream/10397/> [Accessed 23 July 2015]
- Cochran-Smith, M. Lytle. S. L. (1993). *Inside/Outside Teacher Research and Knowledge*. New York: Teachers College Press.
- Coffey, A. and Atkinson, P. (1996). *Making Sense of Qualitative Data, Complementary Research Strategies*. London: Sage Publications
- Cohen, A. (2015). Characteristics of effective mobile learning. *Brainscape* [blog]. 14 April 2015. Available from: <http://www.brainscape.com/blog/2010/09/characteristics-of-effective-mobile-learning> [Accessed 6 January 2018]
- Cohen, L., Manion, L. and Morrison, K. (2011) eds. *Research Methods in Education*, 7th ed. Abingdon: Routledge
- Cole, N. L. and Crossman, A. (2017) *Understanding purposive sampling*. Available from <https://www.thoughtco.com/purposive-sampling-3026727> [Accessed 20 January 2018].
- Cooper, R. and Murphy, E. (2016) *Hacking Project Based Learning: 10 Easy Steps to PBL and Inquiry in the Classroom* Cleveland: Times 10
- Crabtree, B. F. and Miller, W. L. (1999) *Doing Qualitative Research*. California: Sage
- Creswell, J. W. (2007) *Qualitative Inquiry & Research Design: Choosing Among Five Approaches*. 2nd ed. London: Sage.
- Creswell, John W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks: Sage.
- Crotty, C. (1998) *The Foundations of Social Research: Meaning and Perspective in the Research process*. London: Sage
- Data Protection Act 2003. *Chapter 23*. (2003) London: The Stationary Office
- Dawson, C. (2009) *Introduction to Research Methods: A practical guide for anyone undertaking a research project*. 4th ed. Oxford: How to Books Ltd
- Day, C., Harris, A., Hadfield, M., Tolly, H. and Beresford, J. (2000) *Leading Schools in Times of Change*. Buckingham: Open University Press.
- DCSF (2009) *The National Strategies*. London: HMSO Dearing, R. (1994) *The Dearing Review 1994: The National Curriculum and its Assessment: Final Report*. London: HMSO
- DeKanter, N. (2004). Gaming redefines interactivity for learning. *Techtrends*. [online]. 49, pp. 26-31. [Accessed 12 August 2017]

Denzin, N. K. and Lincoln Y. S. eds.,(2011) *The SAGE handbook of qualitative research*. California: Sage

Department for Education and Employment (1999). *Curriculum 2000*. HMSO: London

Derry, S., Pea, R., Barran, B., Engle, R., Erickson, F., Goldman, R., Hall., Koschamnn, T., Lemke, J., and Sherin, B. (2010) Conducting video research in the learning sciences: guidance on selection, analysis, technology and ethics. *Journal of the Learning Sciences*. Vol. 19, No. 1, pp. 3-53.

DfE (2013) *The National Curriculum in England: Key stage 3 and 4 framework document* [online], London: HMSO Available from: <http://webarchive.nationalarchives.gov.uk/20131202172639/> [Accessed 21 August 2015]

DfES (1988). *Education Reform Act 1988*. HMSO: London [online] Available from: <http://www.educationengland.org.uk/documents/acts/1988-education-reform-act.pdf> [Accessed 17 August 2015]

DfES (2001). *NgfL pathfinders: Preliminary report on the roll-out of the NgfL programme in ten pathfinder LEAs*. London: HMSO.

DfES (2003). *Fulfilling the Potential: Transforming teaching and learning through ICT in schools*. HMSO: London [online] Available from:<http://webarchive.nationalarchives.gov.uk/20130401151715.pdf> [Accessed 23 August 2017]

DfES (2004). *The National Curriculum: Handbook for secondary teachers in England Key Stage 3 and 4* 2004. HMSO: London [online] Available from: <http://webarchive.nationalarchives.gov.uk/20130401151715/http://www.education.gov.uk/publications/eOrderingDownload/QCA-04-1374.pdf> [Accessed 22 August 2017]

DfES (2005) *e-strategy: Harnessing Technology: Transforming learning and children's services*. London HMSO [online] Available from: <http://webarchive.nationalarchives.gov.uk/20060315075935/dfes.gov.uk/publications/e-strategy/> [Accessed 22 August 2017]

Dillenbourg P. (1999) What do you mean by collaborative learning? In Dillenbourg, P. (Ed) *Collaborative-learning: Cognitive and Computational Approaches*. (pp.1-19). Oxford: Elsevier

Dudovskiy, J. (2016) *The Ultimate Guide to Writing a Dissertation in Business Studies: A Step-by-Step Assistance*. Pittsburgh

Eisenhardt, K. (1989). Agency Theory: *An Assessment and Review*. *The Academy of Management Review*, 14(1), 57-74. Retrieved from <http://www.jstor.org/stable/258191>

Engeström, Y. (1987). *Learning by expanding: An activity-theoretical approach to developmental research*. Helsinki: Orienta-Konsultit.

Flick, U., (2014) *An Introduction to Qualitative Research*. London: SAGE

Frith, H. and Gleeson, K. (2004) Clothing and embodiment: men managing body image and appearance. *Psychology of Men & Masculinity*, 5, pp. 40-48.

Garratt, D. and Forrester, G. (2012) *Education Policy Unravalled*. London: Continuum

George, A. L. and Bennett, A. (2005) *Case Studies and Theory Development in the Social Sciences*. London: MIT Press

Gerring, J. (2004) What is Case Study and what is it good for? Volume 98, Issue 2 May 2004, pp. 341-354 *American political science review*

Gibb, N. (2015) *Reforming education through international evidence*. [OECD Education Policy Outlook Conference], London. 22nd January 2015

Gibbs, G. R., (2007) *Analysing Qualitative Data*. London: SAGE

Givan, C., and Savage, T. (2012) Ethical considerations for educational research in a virtual world. *Interactive Learning Environments*. Vol. 20, No. 3, pp. 239-251

Glaser, B.G. and Strauss, A.L. (2009) *The Discovery of Grounded Theory: Strategies for Qualitative Research*. New Jersey: Transaction Publishers Piscataway

Gokhale, A.A. (1995) Collaborative learning enhances critical thinking. *Journal of Technology education*. 7(1), Available from: <http://scholar.lib.vt.edu/ejournals/JTE/v7n1/gokhale.jte-v7n1.html>. [Accessed 5 Nov. 2017].

Goldstein, S. (2014) Cheating vs Collaborating in Online Learning Environments. *Powerful learning practice*. [blog] 30 May 2014. Available from <https://plpnetwork.com/2014/05/30/cheating-collaborating-online-learning-environments/> [Accessed 15 January 2020]

Gove, M. (2014) *Education Secretary Michael Gove speaks to the BETT conference about how technology and computing are changing education*, 22 January 2014. Available from <https://www.gov.uk/government/speeches/michael-gove-speaks-about-computing-and-education-technology> [Accessed 3 August 2015]

Green, J., Liem, G. A. D. and Martin, A. J., Colmar, S., Marsh, H. W. and McInerney, D. (2012) Academic motivation, self-concept, engagement, and performance in high school: Key processes from a longitudinal perspective. *Journal of Adolescence*. [online]. 35, pp.1111-1122 [Accessed] November 2019]

Griffin, P. (2007) The comfort of competence and the uncertainty of assessment. *Studies in Educational Evaluation*. [online]. 33, pp. 87-99. [Accessed 20 March 2018]

Herr, K. and Anderson, G. L., (2015) *The Action Research Dissertation: A guide for Students and Faculty*. London: SAGE

Hirsch, E.D. (1988) *Cultural Literacy: What Every American Needs to Know USA*. Random House

Hirsch, E. D. (2016) *Why Knowledge Matters: Rescuing Our Children from Failed Educational Theories*. Harvard: Harvard Press

Ho, A. D., Reich, J., Nesterko, S., Seaton, D. T., Mullaney, T., Waldo, J., & Chuang, I. (2014). HarvardX and MITx: *The first year of open online courses* (HarvardX and MITx Working Paper No. 1).

Holub, P. (2008) Cheating – Or Collaborative Learning?. *The Internet Journal of Allied Health Sciences and Practice*. [online]. 6, no page number. [Accessed 15 January 2020]

Hudson, L., and Ozanne, J. (1988). Alternative Ways of Seeking Knowledge in Consumer Research. *Journal of Consumer Research*. [online]. 14, pp. 508–521. [Accessed 10 May 2018]

ICT and e-Learning Policy (2017) School X

ICT and e-learning policy (2017) School X

Issroff, K. and Scanlon, E. (2002) *Using technology in higher education: an active theory perspective*. *Journal of computer assisted learning* [online] 18. (1), pp. 77-83. [Accessed 23 June 2016]

Jedeskog, G. and Nissen, J (2004) ICT in the classroom: is doing more important than knowing? *Educational and Information Technologies*. 9, pp. 37-45 [Accessed 20 June 2018]

Joffe, H. (2012) Thematic Analysis. In: Harper, D. and Thompson, A. eds.,(2012) *Qualitative Research Methods in Mental Health and Psychotherapy: An Introduction for Students and Practitioners*. Chichester: Wiley-Blackwell. pp. 209-224

Johns, C. (2009) *Becoming a Reflective Practitioner*. Chichester: John Wiley and Sons

Johnson, D. W. and Johnson R.T. (1989) *Cooperation and competition: theory and research*. New York Edina: Interaction Book Co.

- Kara, H. (2016) *Analysing Data For Your PhD: An Introduction* [online]. Kindle ed. London: Know More Publishing
- Keengwe, J., Bhargava, M. (2014) Mobile learning and integration of mobile technologies in education. *Educ Inf Technol* [online]. 19, pp. 737–746. [Accessed 20 May 2017]
- Kidd, D. (2018) Project based learning in the curriculum. [Blog]
<https://debrakidd.wpcomstaging.com/2018/06/11/a-rich-curriculum/> (2018) [Accessed 17 September 2020]
<https://debrakidd.wpcomstaging.com/2018/06/11/a-rich-curriculum/>
- King, N. (2012). Doing template analysis. In: Symon, G. and Cassell, C. Eds., (2012) *Qualitative Organizational Research* [online]. Kindle ed. London: SAGE
- Kirschner, P. A., Martens, R. L., and Strijbos, J.-W. (2004). CSCL in higher education? A framework for designing multiple collaborative environments. In: Dillenbourg, P., Strijbos, J.-W., Kirschner, P. A. and Martens, R. L. eds., (2004) *Computer-supported collaborative learning: Vol. 3. What we know about CSCL ... and implementing it in higher education*.
- Kirschner, P. A., Sweller, J. and Clark, R. E. (2006) Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*. [online] 41: 75–86. [Accessed 12 September 2020]
- Kvale, S. and Brinkman, S. (2009) *InterViews: an Introduction to Qualitative Research Interviewing*. (Second Edition). London: Sage.
- Laal, M., & Ghodsi, S.M. (2012). Benefits of collaborative learning. *Journal of Procedia-Social and Behavioral Sciences*, 31, 486-490.
- Lalima, K. and Dangwal, L. (2017) Blended Learning: An Innovative Approach. *Universal Journal of Educational Research*. [online]. 5, 1. pp. 129-136. [Accessed January 2020]
- Larmer, J., Mergendoller, J. and Boss, S. (2015) *Setting the standard for Project Based Learning*. Virginia: ASCD
- Larkin, M. and Thompson, A. (2012) Interpretative phenomenological analysis. In: Thompson, A. and Harper, D., eds., *Qualitative research methods in mental health and psychotherapy: a guide for students and practitioners*. Oxford: John Wiley & Sons, Oxford, pp. 99-116.
- Lee, K., Tsai, C. S., Chait, C. S. and Koht, J. H. L. (2014) Students' perceptions of self-directed learning and collaborative learning with and without technology. *Journal of Computer Assisted Learning* [online]. 30, pp. 425-437. [Accessed 15 May 2018]
- Lewins, A. and Silver, C. (2007) *Using Software in Qualitative Research: A Step-by-Step Guide*. London: Sage
- Magenta book HM Treasury (2011) *The Magenta Book Guidance for evaluation* London: HMSO Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220542/magenta_book_combined.pdf [Accessed 14 July 2016]
- Marshall, P., Willson, P. and de Salas, K. (2010) Action Research in Practice: Issues and Challenges in a Financial Service Case Study. *The Qualitative Report* [online] 15 (1), pp. 76-93 [Accessed 3 July 2017]
- McKinley (1997) The Future of Information Technology in UK Schools. London: McKinsey and Company [online] Available from: <http://rubble.heppell.net/stevenson/McKinsey.pdf> [Accessed 12 August 2016]
- McNiff, J. (2002) *Teaching as Learning: An Action Research Approach*. New York: Routledge

Mercer, J. (2007). The challenges of insider research in educational institutions: Wielding a double-edged sword and resolving delicate dilemmas. *Oxford Review of Education*, 33(1), 1–17.10.

Mercer, N. (1996) *Words and Minds: How we use language to think together*. London, Routledge.

Merriam, Sharan B. (1998). *Qualitative research and case study applications in education* (2nd ed.). San Francisco, CA: Jossey-Bass Publishers.

Merriam, Sharan B. (2009). *Qualitative research: A guide to design and implementation* (4th ed.). San Francisco, CA: Jossey-Bass.

Meurant, R. (2009) The Significance of Second Language Digital Literacy Why English-Language Digital Literacy Skills Should be Fostered in Korea. *Fourth International Computer Science Journal*. [online]. 1, pp. 369 - 374. [Accessed 23 August 2017]

Moore, C. (2005) Is ICT being used to its potential to improve teaching and learning across the curriculum?. *Teacherresearch* Available from: http://www.teacherresearch.net/tr_ma_4484_cdmoore.pdf [Accessed 20 September 2019]

Morrow, S. L. (2005). Quality and trustworthiness in qualitative research in counselling psychology. *Journal of Counselling Psychology*, 52(2), 250–260. <http://doi.org/10.1037/0022-0167.52.2.250>

Murphy, G. D. (2011) A summary of early iPad technology adoption in tertiary environments. *E-Journal of Business Education & Scholarship of Teaching* [online]. 5, pp. 18-32. [Accessed 12 May 2017]

National Curriculum Council (1994). The Warwick Evaluation (1994) *Evaluation of the Implementation of English in the National Curriculum at Key Stages 1, 2 and 3 (1991-1993)*. London: HMSO [online] Available from: <http://www.educationengland.org.uk/documents/warwick/warwick1994.html> [Accessed 16 July 2015]

Neuman, L. W. (2000) *Social Research Methods: Qualitative and Quantitative Approaches*. USA: Allyn and Bacon

Oates, T. (2010) Could do better: Using international comparisons to refine the National Curriculum in England *The Curriculum Journal* [online]. 22(2). pp. 121-150 [Accessed 16 September 2020]

O’Gorman and MacIntosh (2015) *Introducing Management in a Global Context*. London: Goodfellow Publisher Limited

O’Leary, Z. (2010) *The Essential Guide to Doing your Research project*. 3rd ed. London: Sage

Oblinger, D. (2004) The next generation of educational engagement. *Journal of Interactive Media in Education*. [online]. 8, (no pages). [Accessed 2 July 2018]

OECD (2014) *The Programme for International Student Assessment (PISA)* [online]. London: OECD. Available from: <http://www.oecd.org/pisa/home/> [Accessed 28 June 2014].

OECD (2016) *Measuring Innovation in Education* [online]. London: OECD. Available from: https://www.oecd-ilibrary.org/education/measuring-innovation-in-education_9789264215696-en [Accessed 12 June 2018].

Ofcom (2014) *Techie teens are shaping how we communicate* [online]. London: Ofcom. Available from: <http://media.ofcom.org.uk/news/2014/cmr-uk-2014/> [Accessed 8 July 2015]

Ofsted (2002) *ICT in Schools: Effect of government initiatives*. London: Ofsted Publications [online] Available from: [http://dera.ioe.ac.uk/10148/1/ICT_in_schools_-_effect_of_government_initiatives_\(HMI_423\).pdf](http://dera.ioe.ac.uk/10148/1/ICT_in_schools_-_effect_of_government_initiatives_(HMI_423).pdf) [Accessed 27 August 2016]

Ofsted (2010) *The safe use of new technologies* [online]. Manchester: Ofsted Available from: <http://www.ofsted.gov.uk/resources/safe-use-of-new-technologies> [Accessed 23 August 2015]

- Ofsted (2011) *Meeting technological challenges?* [online]. Manchester: Ofsted Available from: <http://www.ofsted.gov.uk/resources/meeting-technological-challenges> [Accessed 9 August 2016]
- Ofsted (2012.a) *Keeping pace with technology* [online]. Manchester: Ofsted Available from: <http://www.ofsted.gov.uk/news/keeping-pace-technology> [Accessed 12 August 2016]
- Ofsted (2012.b) *Using technology creatively to develop students' understanding: Hull College* [online]. Manchester: Ofsted Available from: <http://www.ofsted.gov.uk> [Accessed 15 August 2016]
- Opie, C. (2009) *Doing Educational Research. 2nd ed* London: Sage
- Ormston, R., Spencer, L. and Barnard, M. (2014) The Foundations of Qualitative Research. In: Ritchie, J., Lewis, J., McNaughton Nicholls, C. and Ormston, R., eds., (2014) *Qualitative Research Practice: A guide for social science students and researchers*. London: Sage, pp. 1-25
- Panitz, T. (1999). *Collaborative versus Cooperative Learning: A Comparison of the Two Concepts Which Will Help Us Understand the Underlying Nature of Interactive Learning*. Cape Cod Community College, peninsula, Massachusetts; USA
- Park, Y. (2011). A pedagogical framework for mobile learning: categorizing educational applications of mobile technologies into four types. *International Review of Research in Open and Distance Learning* [online]. 12(2), 78-102. [Accessed 20 May 2017]
- Park, Y. (2011). A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types. *The International Review of Research in Open and Distance Learning*. [online]. 12, pp. 78-102. [Accessed 20 April 2018]
- Parker, I. (2004) Criteria for qualitative research in psychology. *Qualitative Research in Psychology*. 1, pp. 95-106.
- Pasquainelli, E. (2010) *The illusion of reality: Cognitive aspects and ethical drawbacks: The case of Second Life*. Charlotte, NC: Information Age Publishing
- Pedaste, M., Maeots, M., Siiman, L., de Jong, T., van Riesen, S., Kamp, E., Manoli, C., Zacharia, Z. and Tsourlidaki, E. (2015) Phases of inquiry-based learning: Definitions and the inquiry cycle, *Educational Research Review*, [online]. 14, pp. 47-61. [Accessed 12 September 2020]
- Plant, R. W. and Ryan, R. M. (1985). Intrinsic motivation and the effects of self-consciousness, self-awareness, and ego-involvement: An investigation of internally controlling styles. *Journal of Personality*. 53, pp.435–449
- Plevin, R. (2017) *Attention-Grabbing Starters & Plenaries for Teachers: 99 Outrageously Engaging Activities to Increase Student Participation and Make Learning Fun (Needs-Focused Teaching Resource)*. London: Life Raft Media
- Prawat, R. and Floden, R. (1994) Philosophical perspectives on constructivist views of learning, *Educational Psychologist*, 29, pp. 37-48.
- Procter, C. T. (2003) Blended learning in practice. [*Education in a Changing Environment conference*], Salford September 2003
- Punch, K. (2005) *Introduction to Social Research: Quantitative and qualitative approaches*. London: Sage Publications.
- Rambe, P. (2012) Activity theory and technology mediated interaction: Cognitive scaffolding using question-based consultation on Facebook. *Australian Journal of Educational Technology*. [online] 28 (8), pp. 1333-1361 [Accessed 19 July 2015]
- Richards, K. (2003) *Qualitative Inquiry in TESOL*. Basingstoke: Palgrave Macmillan
- Richardson, Virginia. (1998). How teachers change. *Focus on Basics*. [online] 2, pp. 7-11 [accessed 20 July 2015]

- Ritchie, J., Lewis, J., McNaughton Nicholls, C. and Ormston, R., eds., (2014) *Qualitative Research Practice: A guide for social science students and researchers*. London: Sage
- Roller, M. R., & Lavrakas, P. J. (2015). *Applied qualitative research design: A total quality framework approach*. New York: Guilford Press.
- Rutherford, Stephen M., ed. 2014. *Collaborative learning: theory, strategies and educational benefits*. Nova.
- Ryan, K. and Bradley Cousin, J. (2009) (Eds.) *The Sage international handbook of educational evaluation* London: Sage
- Sarantakos, S. (2005). *Social research*. New York: Palgrave Macmillan.
- Scheerens, J., Glas, C. and Thomas, S. (2007) *Educational Evaluation, Assessment and Monitoring: A Systemic Approach*. London: Taylor and Francis
- School X (2017) *Academic Curriculum Policy*
- School X (2017) *Teaching and Learning Policy*
- Seale, C. (2000). Using computers to analyse qualitative data. In D. Silverman (Ed.), *Doing qualitative research: A practical handbook* (pp. 155-174). London: Sage.
- Seale, C. (2011) *Researching Society and Culture*. London: Sage Publishing
- Sensoy, O. & DiAngelo, R (2009). *Developing social justice literacy: An open letter to our faculty colleagues*. Phi Delta Kappan, 90(5), p. 350.
- Shadiev, R., Hwang, W.-Y., Ghinea, G., & Chang, M. (2018). Guest Editorial: Authentic Edutainment with Advanced Technologies. *Educational Technology & Society*, 21 (4), pp.111–114.
- Silver, H. (2006) *Evaluation Research in Education*. Available from: <http://www.edu.plymouth.ac.uk/resined/evaluation/> [Accessed 7 August 2014]
- Silverman, D. (1993) *Interpreting qualitative data: methods, for analysing talk, text and interaction* (London, Sage Publications).
- Silverman, D. (2000) *Doing qualitative research: a practical handbook*. London: Sage Publications
- Smeets, E. (2005) Does ICT contribute to powerful learning environments in primary education?. *Computers & Education* 44 (2005) 343–355
- Smith, J., Flowers, P. and Larkin, M. (2009) *Interpretative Phenomenological Analysis: Theory, Method and Research*. London: SAGE.
- Smith, L. (1978). An evolving logic of participant observation, educational ethnography, and other case studies. In L. Shulman (Ed.), *Review of researching education* (pp. 316-377). Itasca, IL: F. E. Peacock.
- Smythe, I. (2010) *Dyslexia in the Digital Age: Making IT Work*. London: Continuum
- Snape, D., & Spencer, L. (2003). The foundations of qualitative research In J. Ritchie & J. Lewis (Eds.), *Qualitative Research Practice* (pp. 1-23). Los Angeles: Sage.
- Somekh, B., Woodrow, D., Barnes, S., Triggs, P., Sutherland, R., Passey, D., Holt, H., Harrison, C., Fisher, T., Flett, A. and Joyes, G. (2002) *Final report on the rollout of the NGfL programme in ten Pathfinder LEAs*. Nottingham: DfES Publications.
- Spencer, L., Ritchie, J., Ormston, R., O'Connor, W. and Barnard, M. (2014) Analysis: Principles and Process. In: Ritchie, J., Lewis, J., McNaughton Nicholls, C. and Ormston, R., eds., (2014) *Qualitative Research Practice: A guide for social science students and researchers*. London: Sage, pp. 269-293

Stake, R. (1995). *The Art of Case Study*. London: Sage

Stake, Robert E. (2005). *Multiple case study analysis*. New York, NY: Guilford.

Stein, J. and Graham, C. R., (2014) *Essentials for Blended Learning: A Standards-Based Guide* San Francisco: Routledge.

Stephen M. Rutherford, A. M., Limorenko, G. and Shore, A. M. (2016) Why do students not engage in Collaborative Learning outside of class? [8th Annual Conference on Higher Education Pedagogy], Virginia February 2016]

Stevenson (1997) *Information and Communication Technology in UK Schools: An Independent Inquiry*. London: Independent ICT in Schools [online] Available from: <http://rubble.heppell.net/stevenson/ICT.pdf> [Accessed 2 August 2015]

Swann, W. (2013) The Impact of Applied Cognitive Learning Theory on Engagement with eLearning Courseware. *Journal of Learning Design* [online] 6. (1), pp 61-74. [Accessed 14 July 2015]

Sweeney, P. (2013) Is there Evidence for Differential Benefits between Mobile Devices Used for Self-access Learning as Opposed to Language Learning in the Classroom with the Teacher? Monterey CA: *The International Research Foundation for English Language Education*. [online] Available form: http://www.tirfonline.org/wp-content/uploads/2013/12/TIRF_MALL_Papers_Sweeney.pdf [Accessed 20 July 2015]

Thomas, G. (2011) *How to do your case study: A guide for students and researchers*. London: Sage Publications.

Thomas, L., Jones, R. and Ottaway, J. (2015) *Effective practice in the design of directed independent learning opportunities*. London: The Higher Education Academy

Tomlinson, M. (2004) *14-19 Curriculum and Qualifications Reform Final Report of the Working Group on 14-19 Reform* [online]. London: DfES Publications. Available from: <http://www.educationengland.org.uk/documents/pdfs/2004-tomlinson-report.pdf> [Accessed 15 October 2017].

Traxler, J., (2007) Defining, Discussing and Evaluating Mobile Education, *International Review of Research in Open and Distance Learning* Vol. 8, No 2 (2007)

Traxler, J. (2010) Students and mobile devices, *ALT-J: Research in Learning Technology*, 18:2, 149-160, DOI: 10.1080/09687769.2010.492847

Traxler, J. (2013) Mobile Learning for Languages: Can the Past Speak to the Future? Monterey CA: *The International Research Foundation for English Language Education*. [online] Available form: <http://www.tirfonline.org/english-in-the-workforce/> [Accessed 20 June 2016]

Tripp, D., H. (2003) Action Inquiry Action Research e-Reports. [online] Available from: <http://www2.fhs.usyd.edu.au/arrow/arer/017.htm#Distinguish%20action%20research> [Accessed 25 June 2015]

Uden, L. (2007) Activity theory for designing mobile learning. *International Journal Mobile Learning and Organisation*. (Volume not given) ,pp81-102 [online] Available from: <http://inderscience.metapress.com/content/ew9veadd3eufjhv3/> [Accessed 1 April 2016]

UNESCO (2011) *ICT Competency Framework for Teachers*. Paris: UNESCO

UWE (2020) *Research ethics policy and procedures* [online]. Available from <https://www1.uwe.ac.uk/research/researchethics/policyandprocedures.aspx> [Accessed 20 April 2020]

Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2010). *Elementary and middle school mathematics: Teaching developmentally* (7th ed.). Boston, MA: Allyn & Bacon.

Vannucci, A., Flannery, K. M. and McCauley Ohannessian, C. (2017) Social media use and anxiety in emerging adults. *Journal of Affective Disorders* [online]. 207, pp. 163-166 [Accessed 12 July 2018]

- Veenstra, B., van Geert, P. and van der Meulen, B. (2009). Is edutainment software really educational? A feature analysis of Dutch edutainment software for young children. *Netherlands Journal of Psychology* [online] 66. (1), pp. 50-67. [Accessed 4 August 2015]
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wang, C., Ke, Y., Wu, J., and Hsu, W. (2011) Collaborative Action Research on Technology Integration for Science Learning. *Journal of Science Education & Technology* [online] 21 (1), pp.125-132. [Accessed 23 July 2015]
- Warring, S. (2013) A Model of Independent Learning Applied to the Online Context. *The Quarterly Review of Distance Education*. [online] 14. (1), pp25-34 [Accessed 07 March 2015]
- Watson, D. (1993). *Impact – An Evaluation of the Impact of the Information Technology on Children's Achievements in Primary and Secondary School*. London: King's College London.
- We are apps (2013) *UK mobile device usage and demographic roundup* [online]. London: We are apps. Available from: <http://www.weareapps.com/digitalreport.pdf> [Accessed 7 July 2015]
- Weitzman, E. A. (2011) Software and Qualitative Research. In: Denzin, N. K. and Lincoln Y. S. eds., (2011) *The SAGE handbook of qualitative research*. California: SAGE. pp. 803-820
- Williams, D. (2016) *Leadership for teacher learning*. Learning Science International USA
- Willimen, N. and Buckler, S. (2010) *Your Dissertation in Education*. 2nd ed. London: Sage.
- Wolf, A. (2011), *Review of vocational education: The Wolf report*. London: DfE
- Wood, D. J., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychiatry and Psychology*, 17(2), pp.89-100.
- Yamagata-Lynch, L. C. (2010) *Activity System Analysis Methods: Understanding Complex Learning Environments*. New York: Springer.
- Yazan, B. (2015) Three Approaches to Case Study Methods in Education: Yin, Merriam, and Stake. *The Qualitative Report*. [online]. 20, pp. 134-152. [Accessed 20 July 2017]
- Yin, R., K. (2014). *Case Study Research Design and Methods* (5th ed.). Thousand Oaks, CA: Sage.
- Yin, R.K. (2003). *Case Study Research – Design and Methods* (3rd ed). London: Sage Publications
- Youni, S. (2006) *Implementing government policy on ICT in Education: Lessons learnt: Education Information Technology* [online] 11 (1), pp.385-400 [Accessed 23 July 2015]
- Young, M. (2011) The future of education in a knowledge society: the radical case for a subject-based curriculum. *Journal of the Pacific Circle Consortium for Education*, [online], 22 (1), 21–32. [Accessed 21 September 2020]
- Young, M. and Muller, J. (2013) On the powers of powerful knowledge *Review of Education* [online]. 3 (1), pp.229-250 [Accessed 20 September 2020]
- Zin, M. and Zain, M. (2010) *The Effects of Edutainment Towards Students' Achievements*. Project [online] University Pendidikan Sultan Idris. Available from http://www.academia.edu/489354/THE_EFFECTS_OF_EDUTAINMENT_TOWARDS_STUDENTSAC_HIEVEMENTS [Accessed 10 July 2014]

Appendices contents

Appendix A	Examples of screen shots from the CLP.	241 -246
Appendix B	Letters sent to parents, pupils and teachers outlining the research study.	247 - 251
Appendix C	THE FREC UWE ethical permission form:	252 - 253
Appendix D	The online questionnaire – this contains a blank copy and two completed copy to demonstrate responses from Y7 and Y12 pupils.	254 - 260
Appendix E	The interview transcript – this contains a blank copy and three completed transcripts to demonstrate responses from a Y7, Y12 pupils and a teacher.	261 - 271
Appendix F	Screen shots of coding and data analysis from Quirkos.	272 - 275
Appendix G	This contains copies of the initial a priori themes, redefined a priori themes from after the questionnaire analysis and final redefinition of the a priori themes.	276 - 279

Appendix A

Examples of screen shots from the CLP.

Site map for the Collaborative learning platforms used in the study.
 The Year 7 and 12 platforms were independent of each other.

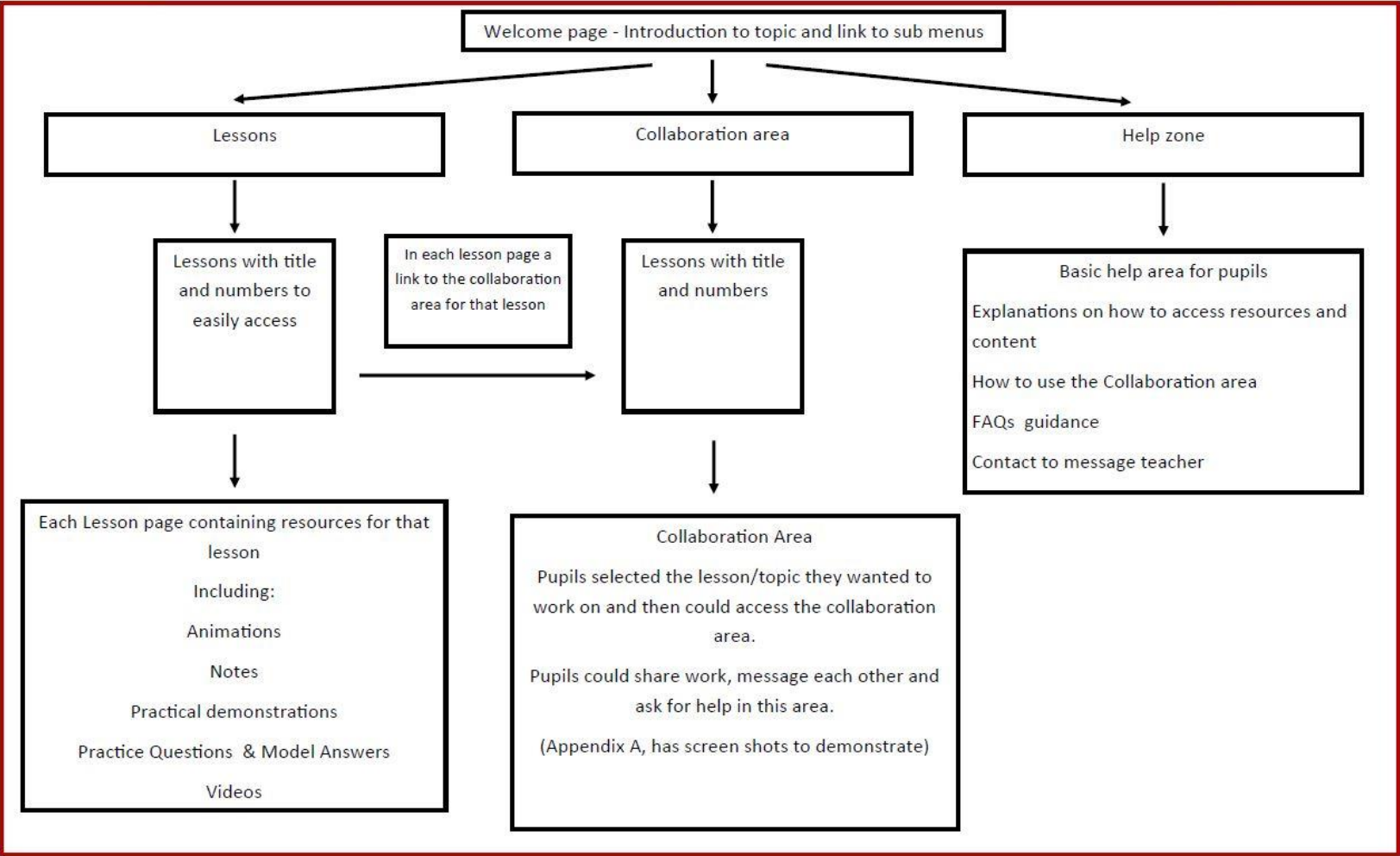


Image 1: Annotated screen shot of the Y7 CLP welcome page.

The screenshot shows the Y7 Welcome Page with the following content:

- Sidebar (Left):** A list of lessons from Lesson 1 to Lesson 22, plus a Help Page. A red box labeled "Link to pages for lessons" points to the sidebar.
- Main Header:** "Y7 Welcome Page:" followed by "Welcome to Year 7 Physics".
- Images:** Two images are displayed. The left one shows a tree with red apples and the text "WHAT IS PHYSICS?". The right one is a blue background with various physics diagrams and equations.
- Quick Links:** A section titled "Quick Links:" containing two links:
 - "Working together: [Access the Collaborative learning area](#)"
 - "Help!!! [How to use the Collaborative Learning Platform](#)"

Annotations:

- A red box labeled "Link to help" points to the "Help Page" in the sidebar.
- A red box labeled "Link to help pages and guide to use the" points to the "How to use the Collaborative Learning Platform" link.
- A red box labeled "Link to access the collaboration space for each lesson" points to the "Access the Collaborative learning area" link.

Y7—Collaborative learning platform examples

Figure 1— Y7 Collaborative work on circuit symbols

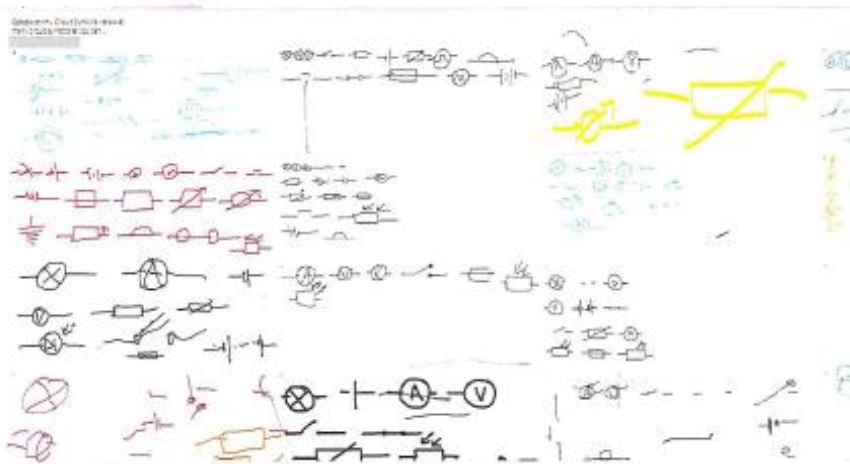


Figure 2— Y7 Collaborative work on energy resources

LS:Energy resources



Advantage: No harmful polluting gases are produced.
Disadvantages: Wind farms are noisy and may spoil the view for living people living near them.

Figure 3— Two pupils exchanging ideas on energy resources in the collaboration area

Wind power advantage and disadvantage:

Advantage: It is cheaper than some of the other ways of producing electricity.

Disadvantage: wind farms are very noisy.

Solar power advantage and disadvantage:

Advantage: solar power is pollution free and causes no greenhouse gases

Disadvantage: it doesn't work on cloudy days.

Nuclear power advantage and disadvantage:

Advantage: The cost of nuclear fuel is 20% of the cost of energy generated.

Disadvantage: non renewable

Wave power advantage and disadvantage:

Advantage: It will never run out

Y12—Collaborative learning platform example

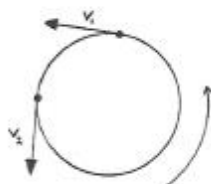
Figure 6—Example from of notes, animations and videos from a Y12 lesson

Circular motion

Circular Motion



When an object moves in a circle at a constant speed its velocity (which is a vector) is constantly changing. Its velocity is changing not because the magnitude of the velocity is changing but because its direction is. This constantly changing velocity means that the object is accelerating (**centripetal acceleration**). For this acceleration to happen there must be a resultant force, this force is called the **centripetal force**.



Conceptual Problem

Calculate the centripetal force on a 1000 kg car moving at 10 m/s in a circle of radius 50 m.



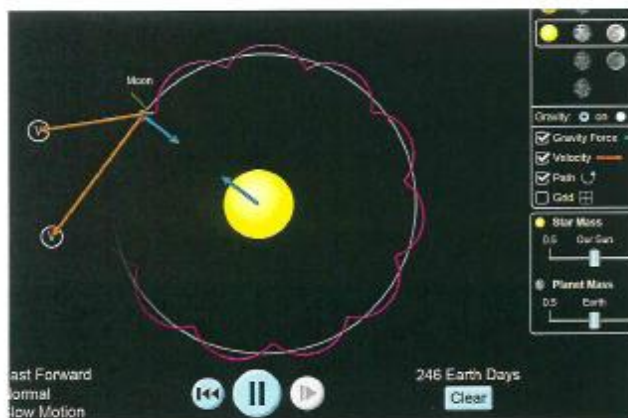
$$F = \frac{mv^2}{r}$$

Conceptual Question

What is the centripetal force on a 1000 kg car moving at 10 m/s in a circle of radius 50 m? The centripetal force is provided by the friction between the tires and the road.



$$F = \frac{mv^2}{r} = 1000 \frac{m^2}{s^2}$$



Appendix B

Letters sent to parents, pupils and teachers outlining the research study.

Benefits and Barriers: Exploring Innovations in Collaborative Learning Platforms use in a case study school.



Dear Parent/Guardian,

I am writing to you to outline educational research, which I have asked your son/daughter to participate in. The research is for my doctorate in education and the following information outlines my research titled; Benefits and Barriers: Exploring innovations in Collaborative Learning Platforms use in a case study school.

I am writing to you to seek your help in gathering data for this research thesis, and offer you the details in the following paragraphs

Why is this research taking place?

I am currently studying towards a doctorate in education, researching the role of ICT and collaborative learning in the teaching of Physics. The aim of the study is to develop and improve my own teaching practice, develop students' learning skills, improve the resources used within teaching. I hope the research will also be able to inform wider school professional development and may be used in publications.

What is the time frame for the research?

I will be carrying out research over the course of the next two terms based around my teaching of the Physics courses. I will be asking willing participants to complete a short questionnaire at the beginning and end of my study as well asking if any participants would kindly take part in an interview. This will enable me to gather information on the areas of ICT and collaborative learning.

Do students have to take part?

Participation is entirely voluntary. There is no penalty for not taking part, and no personal gain (apart from being helpful in exploring this research) for participants.

Students who participate will be asked to answer a short online questionnaire taking approximately 15 minutes to complete. This will enable me to collect data on their perceptions and reactions related to ICT and collaborative learning. Interviews with a small number of students will take place after the questionnaire to further investigate interesting beliefs, opinions and views raised.

Will students or my college/workplace be mentioned in the research?

Research data will be entirely confidential and individuals or their place of study will not be mentioned.

All responses to questions asked in both the questionnaires and interviews are anonymous and confidential, with all data securely stored. Only my supervising university tutors and I will have access to the data. All the data will be securely destroyed at the end of the study.

What if students who take part and change my mind?

All participants have the right to withdraw from the study at any time up to when the data is analysed and research findings are written up. If a participant wishes to withdraw, you can do this up to that point: 10th of February 2017, there is no penalty for withdrawing from this research.

Benefits and Barriers: Exploring Innovations in Collaborative Learning Platforms use in a case study school.

To withdraw you can contact myself directly, or by email ([christopher.telfer@\[REDACTED\]](mailto:christopher.telfer@[REDACTED])) or you can contact my Director of Studies Dean Smart, [dean.smart@\[REDACTED\]](mailto:dean.smart@[REDACTED]) (From the university of the West of England)

If you do withdraw then any data, which can be linked to you, will be removed from the study and destroyed.

Will I be involved in the research?

The research process requires a sample group of a certain size. Therefore, if all students asked to participate in the research agree I will then need to select a sample group in order to ensure that the research is manageable.

Is there anything else I should know?

If you have any questions, please feel free to ask or email.

Kind regards

Christopher Telfer



Dear Student/Colleague,

The following information outlines my research titled; Benefits and Barriers: Exploring innovations in Collaborative Learning Platforms use in a case study school.

I am writing to you to seek your help in gathering data for this research thesis, and offer you the details in the following paragraphs

Why is this research taking place?

I am currently studying towards a doctorate in education, researching the role of ICT and collaborative learning in the teaching of Physics. The aim of the study is to develop and improve my own teaching practice, develop students' learning skills, improve the resources used within teaching. I hope the research will also be able to inform wider school professional development and may be used in publications.

What is the time frame for the research?

I will be carrying out research over the course of the next two terms based around my teaching of the Physics courses. I will be asking willing participants to complete a short questionnaire at the beginning and end of my study as well asking if any participants would kindly take part in an interview. This will enable me to gather information on the areas of ICT and collaborative learning.

Do I have to take part?

Participation is entirely voluntary. There is no penalty for not taking part, and no personal gain (apart from being helpful in exploring this research) for participants.

Students who participate will be asked to answer a short online questionnaire taking approximately 15 minutes to complete. This will enable me to collect data on their perceptions and reactions related to ICT and collaborative learning. Interviews with a small number of students will take place after the questionnaire to further investigate interesting beliefs, opinions and views raised.

Will I or my college/workplace be mentioned in the research?

Research data will be entirely confidential and individuals or their place of study will not be mentioned.

All responses to questions asked in both the questionnaires and focus groups are anonymous and confidential, with all data securely stored. Only my supervising university tutors and I will have access to the data. All the data will be securely destroyed at the end of the study.

What if I take part and change my mind?

You have the right to withdraw from the study at any time up to when the data is analysed and research findings are written up. If you choose to withdraw, you can do this up to that point: 10th of February 2017, there is no penalty for withdrawing from this research.

To withdraw you can contact myself directly, or by email (christopher.telfer@epsomcollege.org.uk) or you can contact my Director of Studies Dean Smart, dean.smart@uwe.ac.uk. ([REDACTED] of the West of England) [REDACTED]

If you do withdraw then any data, which can be linked to you, will be removed from the study and destroyed.

Will I be involved in the research?

The research process requires a sample group of a certain size. Therefore, if all students asked to participate in the research agree I will then need to select a sample group in order to ensure that the research is manageable.

Is there anything else I should know?

If you have any questions, please feel free to ask or email.

Kind regards

Christopher Telfer

Appendix C

THE FREC UWE ethical permission form:

Tel: 0117 328 1170

UWE REC REF No: ACE.17.01.020

7th September 2017

Dear Christopher

Application title: Help or hindrance? A case study exploring the impact of collaborative data platforms and independent learning in the teaching and learning of physics

I am writing to confirm that the Faculty Research Ethics Committee are satisfied that you have addressed all the conditions relating to our previous letter sent on 21st March 2017 and the study has been given ethical approval to proceed.

Please note that any information sheets and consent forms should have the UWE logo. Further guidance is available on the web:

<http://www1.uwe.ac.uk/aboutus/departmentsandservices/professionalservices/marketingandcommunications/resources.aspx>

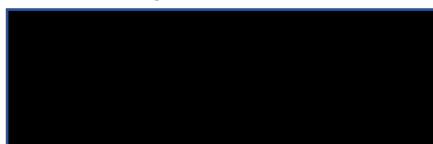
The following standard conditions also apply to all research given ethical approval by a UWE Research Ethics Committee:

1. You must notify the relevant UWE Research Ethics Committee in advance if you wish to make significant amendments to the original application: these include any changes to the study protocol which have an ethical dimension. Please note that any changes approved by an external research ethics committee must also be communicated to the relevant UWE committee.
<http://www1.uwe.ac.uk/research/researchethics/applyingforapproval.aspx>
2. You must notify the University Research Ethics Committee if you terminate your research before completion;
3. You must notify the University Research Ethics Committee if there are any serious events or developments in the research that have an ethical dimension.

Please note: The UREC is required to monitor and audit the ethical conduct of research involving human participants, data and tissue conducted by academic staff, students and researchers. Your project may be selected for audit from the research projects submitted to and approved by the UREC and its committees.

We wish you well with your research.

Yours sincerely



Appendix D

The online questionnaire – this contains a blank copy and two completed copy to demonstrate responses from Y7 and Y12 pupils.

N.B. This questionnaire was reproduced online for us with the pupils in the study, so the format in this document is different from the online version. The pupils' responses on pages also have a different format due how they are exported from the website.

A blank copy of the online questionnaire



Questionnaire:

Part A: 1 Background questions – Collaborative Learning

Answer the following questions using the tick boxes and scale. 1 Not very confident, 2 not confident, confident and 4 very confident.

No.	Question	1	2	3	4
a	Do you feel confident working with other students when solving problems?				
b	Do you feel working as part of a group helps you to learn?				
c	If working as part of a group do you feel confident that you can help others?				

d. Do you work with other students outside of the classroom/in prep? Yes No

e. Do you feel embarrassed when you have to work as a part of a group? Yes No

If yes, please explain your answer.

.....

f. Do you/your class have a WhatsApp or Facebook or email group for any of your subjects? If yes which ones?

.....

2. Background questions – IT/ICT

Answer the following questions using the tick boxes and scale. 1 Not very confident, 2 not confident, confident and 4 very confident.

No.	Question	1	2	3	4
a	How confident are you using ICT?				
b	Are you confident in using ICT for work outside the classroom (e.g. homework)?				
c	Are you able to find the correct information to complete work using ICT?				

d. Do you regularly use ICT/IT in lessons? Yes No

If yes, can you explain what use you make of this?

.....

e. Do you regularly use a mobile device to access schoolwork? Yes No

If yes, can you explain what use you make of this?

.....

Part B:

3. What do you think the term collaborative learning means?

.....
.....
.....
.....

4. How do you think students can work together in a group in order to understand a topic?

.....
.....
.....

5. How does working with fellow students in groups or via conversation enable you to learn?

.....
.....
.....

6. What could prevent you from collaborating with your peers when learning?

.....
.....
.....

7. What sort of platform (ICT based e.g. Firefly) could aid your learning and what resources would it include?

.....
.....
.....

8. Are you prepared to take part in an interview to further explore ideas that you have discussed in this questionnaire?

Yes/No

N.B: The difference in the questionnaire format below is due to how the software used output the data. The data once downloaded was sorted as set out in the blank questionnaire above.

A Y7 pupil's responses to the online questionnaire

Student collaborative learning and e-learning survey 1

#27

COMPLETE

Collector: Web Link 1 (Web Link)
Started: Wednesday, January 17, 2018 6:28:21 PM
Last Modified: Wednesday, January 17, 2018 6:40:46 PM
Time Spent: 00:12:24
IP Address: 81.141.113.66

Page 1: Part A: Background questions - Collaborative Learning

Q1 Year Y7 Pupil

Q2 Do you feel confident working with other students when solving problems? **Confident**

Q3 Do you feel working as part of a group helps you to learn? **Confident**

Q4 If working as part of a group do you feel confident that you can help others? **Confident**

Q5 Do you work with other students outside of the classroom/in prep **No**

Q6 Do you feel embarrassed when you have to work as a part of a group? **No**

Q7 Do you/your class have a WhatsApp or Facebook or email group for any of your subjects? If yes which ones? And what do you discuss about work? **No**

Page 2: Part B: Background questions - IT/ICT

Q8 How confident are you using ICT? **Confident**

Q9 Are you confident in using ICT for independent learning (e.g. prep)? **Confident**

Q10 Are you able to find the correct information to complete work using ICT? **Confident**

1 / 2

Student collaborative learning and e-learning survey 1

Q11 Do you regularly use ICT/IT in lessons? (If yes, can you explain what use you make of this?)

Yes,

Explain::

We use our textbooks on our iPads and we use language apps like quizlet.

Q12 Do you regularly use a mobile device to access schoolwork? If yes, can you explain what use you make of this?

Yes,

Explain::

I use my school ipad

Page 3: Part C: Collaborative learning and IT

Q13 What do you think the term collaborative learning means?

When you work with peers or other people

Q14 How do you think students can work together in a group in order to understand a topic?

By discussing ideas and working through problems together

Q15 How does working with fellow students in groups or via conversation enable you to learn?

My peers and I, share information and learn from each others knowledge.

Q16 What could prevent you from collaborating with your peers when learning?

Getting distracted by other conversations or people not concentrating.

Q17 What sort of platform (ICT based e.g. Firefly) could aid your learning and what resources would it include?

Educational video clips and giving us information on firefly.

Q18 Are you prepared to take part in an interview to further explore ideas that you have discussed in this questionnaire? (If yes please enter your name in the text box)

No

A Y12 pupil's responses to the online questionnaire

Student collaborative learning and e-learning survey 1

#7

COMPLETE

Collector: Web Link 1 (Web Link)
 Started: Tuesday, December 12, 2017 6:20:38 PM
 Last Modified: Tuesday, December 12, 2017 6:36:49 PM
 Time Spent: 00:16:10
 IP Address: 212.250.240.129

Page 1: Part A: Background questions - Collaborative Learning

Q1 Year Year 12

Q2 Do you feel confident working with other students when solving problems? Not confident

Q3 Do you feel working as part of a group helps you to learn? Confident

Q4 If working as part of a group do you feel confident that you can help others? Not very confident

Q5 Do you work with other students outside of the classroom/in prep? Yes

Q6 Do you feel embarrassed when you have to work as a part of a group? No

Q7 Do you/your class have a WhatsApp or Facebook or email group for any of your subjects? If yes which ones? And what do you discuss about work? No

Page 2: Part B: Background questions - IT/ICT

Q8 How confident are you using ICT? Not very confident

Q9 Are you confident in using ICT for independent learning (e.g. prep)? Confident

Q10 Are you able to find the correct information to complete work using ICT? Confident

1 / 2

Student collaborative learning and e-learning survey 1

Q11 Do you regularly use ICT/IT in lessons? (If yes, can you explain what use you make of this?) **No**

Q12 Do you regularly use a mobile device to access schoolwork? (If yes, can you explain what use you make of this?) **Yes**

Page 3: Part C: Collaborative learning and IT

Q13 What do you think the term collaborative learning means?

When people collaborate and work together to learn.

Q14 How do you think students can work together in a group in order to understand a topic?

People can share their thoughts and opinions about the topic.

Q15 How does working with fellow students in groups or via conversation enable you to learn?

We can all contribute our own ideas and summarise them.

Q16 What could prevent you from collaborating with your peers when learning?

Lack of confidence to share my own opinions.

Q17 What sort of platform (ICT based e.g. Firefly) could aid your learning and what resources would it include?

Websites like khan academy, mathsandphysicstutor

Q18 Are you prepared to take part in an interview to further explore ideas that you have discussed in this questionnaire? (If yes please enter your name in the text box)



Appendix E

The interview transcript – this contains a blank copy and three completed transcripts to demonstrate responses from a Y7, Y12 pupils and a teacher.

Pupil Blank interview transcript

Benefits and Barriers: Exploring innovations in Collaborative Learning Platforms use in a case study school.

CCJ Telfer



-Interview questions – Participant No:

Brief introduction to the research.

1a. What do you think the term collaborative learning means?

1b. Pick up on any key points or words (Idea of working together/helping each other/sharing knowledge or skills/ideas 3rd form had of cheating).

2a. Does working with other students or as part of a group give you confidence (or not) in your ability to answer questions/solve problems/learn new skills/understand work?

2b. Pick up on any interesting responses!

3a. How do you feel having a dialogue/speaking to other students about your work? Do you feel it affects your understanding of the work or develop your skills?

3b. Does it affect your confidence (positive or negative) if you get something wrong when working in a group?

3c. Is there any reason why you would not want to work as part of a group?

Brief explanation of the CLP that I introduced during the Lent term.

4a. Have you used a, WhatsApp or Facebook or email group (or other) to complete preps or for help in any of your subjects? What have you used it for and what resources or discussions have you taken part in?

4 b. Pick up on any interesting responses

5. Did you have any thoughts/preconceptions about using the CLP or worries as to how your teaching could change?

6. What are thoughts and reactions to the introduction of the CLP which we have used over the course of this term?

7. Do you feel it has aided or disrupted your learning in Physics? Why/Explain.

8. Would something like this be a benefit in another subject? Why/Explain.

A Y7 pupil's interview transcript



Interview questions – Participant No Y7: PN2

Brief introduction to the research.

1a. What do you think the term collaborative learning means?

Where you are working together as one but you copy others so I suppose it means you could be cheating or just copying someone who is clever than you.

1b. Pick up on any key points or words (Idea of working together/helping each other/sharing knowledge or skills/ideas 3rd form had of cheating).

Why if you work together do you think it is cheating or you just have to copy could you not may be explain something to someone to help them understand it?

I just think we thought this was just the easiest thing to do. (Umm...) You show someone else your work or look at theirs. I guess you can explain things to them but it is easier to just copy.

Does that mean that you would just copy or let someone copy you rather than may be try to explain how to do a question or write an answer and is this what you think CL is?

(Umm...) (Pause...) I think it is easier to copy. But, now and again people try to tell me what to or how I should do work. But usually they will also show me their book or work. (Pause...) I think CL is working together but that may include copying.

2a. Does working with other students or as part of a group give you confidence (or not) in your ability to answer questions/solve problems/learn new skills/understand work?

I do not really like working in a group as I worry I may get things wrong. I like working with my friend or two friends but not really with many others. It is not a good feeling if you answer something wrong in class or with your friends sometimes.



2b. Pick up on any interesting responses!

Do you think you improve your understanding through just copying or are you just trying to complete the work?

I am not sure. I do okay in tests but I guess like if I did more work on my own then maybe I may understand the ideas better. I guess that I just want to get the work done so that I can have time to do other stuff and that then means I do not have to work late like. Also once it is done I can do my own thing.

Do you not think that you could still learn if you worked together?

Well umm may be I suppose I guess if they discuss and explain to me then I may like be able to get the ideas from them and that would help me rather than just getting the answers

3a. How do you feel having a dialogue/speaking to other students about your work? Do you feel it helps you to gain a better understanding of the work or develop your skills?

As before I guess if I talk and go over something with others it may help me and might help me get better. ergh... I think it may have improved my understanding of a topic.

3b. Does it affect your confidence (positive or negative) if you get something wrong when working in a group?

Yes, I do not really like working in a group as I worry I may get things wrong. Pause... I worry about what others think of me when this happens.

3c. Is there any reason why you would not want to work as part of a group?

As I have just said worried about looking stupid or messing up answers. Also a lot of my friends will just use it to chat with each other.



4a. Have you used a, WhatsApp or Facebook or email group (or other) to complete preps or for help in any of your subjects? What have you used it for and what resources or discussions have you taken part in?

No I do not use Facebook or WhatsApp. I do email friends to ask for help and also I do ask teachers or email them for help.

5. Did you have any preconceptions about using the CLP or worries as to how your teaching could change?

I was not sure how it might change ~~pause things~~ but was a little worried I may have to work with others and do more things with them.

6. What are thoughts and reactions to the introduction of the CLP which we have used over the course of this term?

I have used it a lot for the revision for the block test. The useful bits have been the equation explainer and the revision questions and worked answers. Umm... Although I was worried about working with others I did like where we were able to all put up answers and suggest ideas before then using the example answers.

7. Do you feel it has aided or disrupted your learning in Physics? Why/Explain.

Umm... I guess it has helped as I did well in the end of topic test and it was better than the marks I got during the last few topic that we covered.

8. Would something like this be a benefit in another subject? Why/Explain.

Yes, if it was able to give me a good set of notes and some questions and answers I can use to help get ready for end of topic tests that would be good.

A Y12 pupil's interview transcript



Interview questions – Participant No Y12: PN4

Brief introduction to the research.

1a. What do you think the term collaborative learning means?

The way in which a number or small group of students can work together through discussions, umm... sharing ideas and resources in order to learn together. I think umm... this is meant to help them build on what they have been taught using independent learning.

1b. *Pick up on any key points or words (Idea of working together/helping each other/sharing knowledge or skills/ideas 3rd form had of cheating).*

How has your idea of working together changed? Do you think you would just copy work from another pupil?

As I have moved into Y12 I now feel I need to understand how to solve a problem. (Pause...) (Umm...) This is rather than in Y11 or Y10 for GCSE where I wanted to just get the answer. I have a better understanding of this due to study skills we have been taught.

2a. **Does working with other students or as part of a group give you confidence (or not) in your ability to answer questions/solve problems/learn new skills/understand work?**

I sometime feel that if I work with others I can explain things to them which helps me to feel better about what I know and that I understand things. Sometimes if I am not confident or do not understand a question I will ask my friends to help. This then allows me to go back over things that the teachers have taught me and hopefully understand it better. I think this then allows me to have a better understanding of the material we have covered and I can practice my math and problem solving skills to make them better.

If I can show my friends that I understand something then I feel confident. (Pause...) But the other is true (pause...) if I get things wrong and then it can annoy me



3a. How do you feel having a dialogue/speaking to other students about your work? Do you feel it helps you to gain a better understanding of the work or develop your skills?

This allows me to repeat what I think that I know. By doing this and going over and through similar problems umm... I have built a better knowledge and understanding of a topic. ergh... I feel I am making progress by practicing what we do in lessons.

3b. Does it affect your confidence (positive or negative) if you get something wrong when working in a group?

Not really. I think it probably helps me now however in the lower years I would be worried about getting something wrong or not being able to answer a question as people may think I do not know or am not clever.

3c. Is there any reason why you would not want to work as part of a group?

If there was someone I did not get along with or someone that was always talking and being distracting.

4a. Have you used a, WhatsApp or Facebook or email group (or other) to complete preps or for help in any of your subjects? What have you used it for and what resources or discussions have you taken part in?

I do but I do not just to copy answers. I prefer to work through with others in person so I can understand a bit more. I know when we did our GCSEs last year we had a group in our classes and sets that we would send any questions to that we did not understand. If messaging others can help me understand what I need to do I think I will get better and do well in the exams and tests. As this is A-level it is harder than before and I need to be able to apply my knowledge to difficult questions.



4 b. Pick up on any interesting responses

Did you want to have more explanation of how to solve the problems then?

Yes, although I was happy if it meant I could do well on a prep and achieve a high mark. But really what I wanted was to know how to solve something or how to answer a question. SO if I could not work it out from what I saw then I would go and ask a teacher.

5. Did you have any thoughts/preconceptions about using the CLP or worries as to how your teaching could change?

No I was unsure of how it would really change anything. I thought there would be more working together and possibly more IT or computers used. May be different from the more traditional teaching.

6. What are thoughts and reactions to the introduction of the CLP which we have used over the course of this term?

I have found some aspects of the CLP useful particularly where I have been able to work through looking at other students' ideas and thoughts on some of the six markers before trying to answer them. I have really liked the brief notes sections and thought there was a good range of other resources on the CLP.

7. Do you feel it has aided or disrupted your learning in Physics? Why/Explain.

I guess that parts of it have helped me. I have tried to work with others a bit more and particularly being a day student and doing work at home means I can use this to get some help if I am unsure or cannot answer a question.

8. Would something like this be a benefit in another subject? Why/Explain.

I guess it would. If it allows me to get quick help then it is good. May depend on subjects and the resources which are put on there.

A Teacher's interview transcript



Interview questioning – Teacher 1

Brief introduction to the research.

1a. Do you think pupils make use of collaborative learning and know what it means from accessing the school study skills sessions?

In my opinion I think possibly in the sixth form, I have seen houses or the library pupils working together on pieces of work. Occasionally I do set group tasks and pupils in Y9-11 can complete these with some guidance. My worries about CL are that pupils may just find distractions when working together so it can lead to the work not being as good. In terms of the study skills programme I think that this is delivered well and certainly it helps with their revision. I am not too sure what other skills are covered but pupils seem to comprehend what CL in the sixth form (Y12-13) and may be Y11.

2. How do you feel pupils can work collaboratively to gain a better understanding of the work and develop your skills?

The idea of working through a task together should aid them in being able to gain a better understanding of it or help each other. If you have a good group of pupils then by sharing their knowledge they could help each other out. I have in class used learners of different abilities to work so they can share knowledge and support each other. I hope as well in some tasks if they may be able to offer further explanation or go over a topic we have covered in class again to help a pupil who has not understood it.

3. Do you know of any pupils using WhatsApp or Facebook, Virtual learning environment or email groups to complete preps for you or to help each other in your subjects?

I do occasionally set a prep on the VLE with work sheets or articles pupils need to read through or resources they need to use in order to complete a prep. I do not specifically tell them to work together to complete it but I am sure some will.

I have heard on a couple of occasions that pupils do use WhatsApp to help each other with preps. I am not sure how much in terms of helping/working through



answers there is but it seems from what I have seen that one or two will complete a prep then send the completed prep to others.

Does this frustrate you?

A little as really you want to see how the individuals are doing but on occasions work does appear to be copied as you can spot the same error in more than two or three preps.

4. What are your thoughts/preconceptions about using the CLP or worries as to how your teaching could change? What may be the barriers and benefits to using this in your teaching?

It sounds interesting, I think with older year groups in the sixth form you may be able to use it or make use of it. I think pupils would need to be clearly shown how to use it and what resources there are available as well as being reminded so they would make use of it.

Time would possibly be the biggest issue to setting something up for myself as it would take a long time to get all the bits you wanted/needed up. I would not want to have to use computers in lessons but if it is a resource pupils can use outside of the classroom then it would help them. A positive side is if you can get pupils to help each other. I like the sound of the collaborative area and that could lead to some good discussions I think. I am not sure all pupils would buy into this as some might not like to have to use it.

5. Do you feel this would aided or disrupted your learning in Physics?

I am not sure I guess that more access to resources and any extra practice for exams etc. would help. Certainly in revision it could be really useful and that is where I think it could work best.



6. Would you consider using the CLP to go along side and aid your teaching?

I think it could be useful again depending on what is on it and how it is targeted. I am slightly worried about the time it may take to set up but I guess once it is there it can be reused or built upon. Also I think as you explained I would need to carefully monitor the collaboration area to check pupils work

|

Appendix F

Screen shots of coding and data analysis
from Quirkos.

Appendix F – Screen shots of coding and data analysis from Quirkos

Figure F1 The initial set up of Quirkos prior to preliminary coding

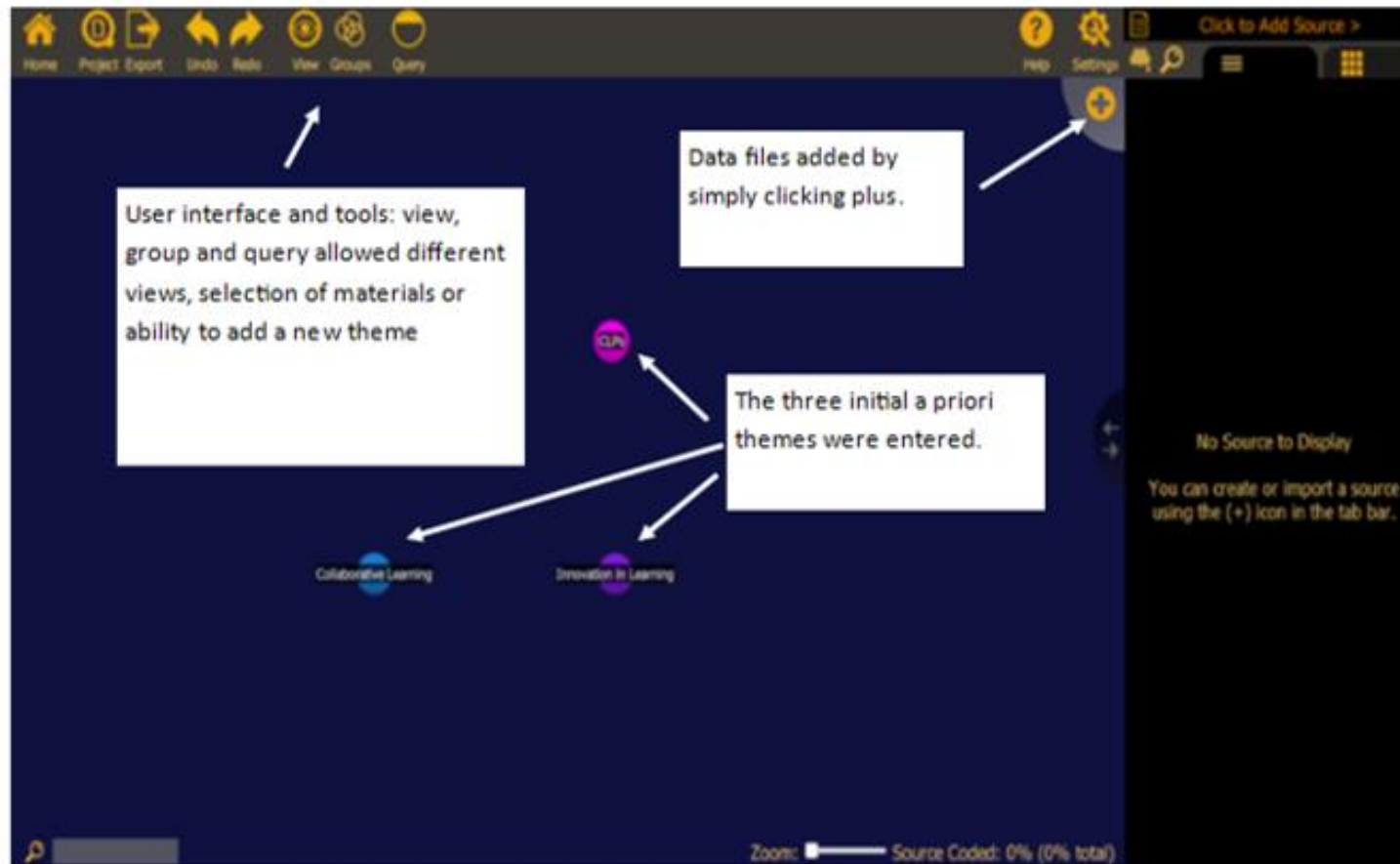


Figure F2 A screen shot of Quirkos whilst coding a participant's transcript

The screenshot displays the Quirkos interface. On the left, a bubble chart visualizes themes and sub-themes. The largest bubble is 'Confidence' (21), followed by 'Aided learning' (20). Other bubbles include 'Disruptions' (10), 'Innovation in learning' (10), 'Language' (5), 'Professional implications' (3), and 'Collaborative Learning' (9). A text box above the chart states: 'Each code/theme had a different coloured bubble.' A green arrow points from the text 'Beneath the CL theme you can see the sub-themes.' to the 'Collaborative Learning' bubble. A white arrow points from the text 'Coloured highlight shows which theme highlighted text is in and sorted into that bubble' to a highlighted section of the transcript. On the right, a transcript window shows interview questions and responses. A text box above it says: 'This area contains the interview transcript of a participant as transcribed into a word document.' The transcript includes questions like '3a. How do you feel having a dialogue/speaking to other students about your work?' and '3b. Does it affect your confidence...'. A red highlight in the transcript is linked to the 'Disruptions' bubble in the chart.

Each tab has the data from a different participant.

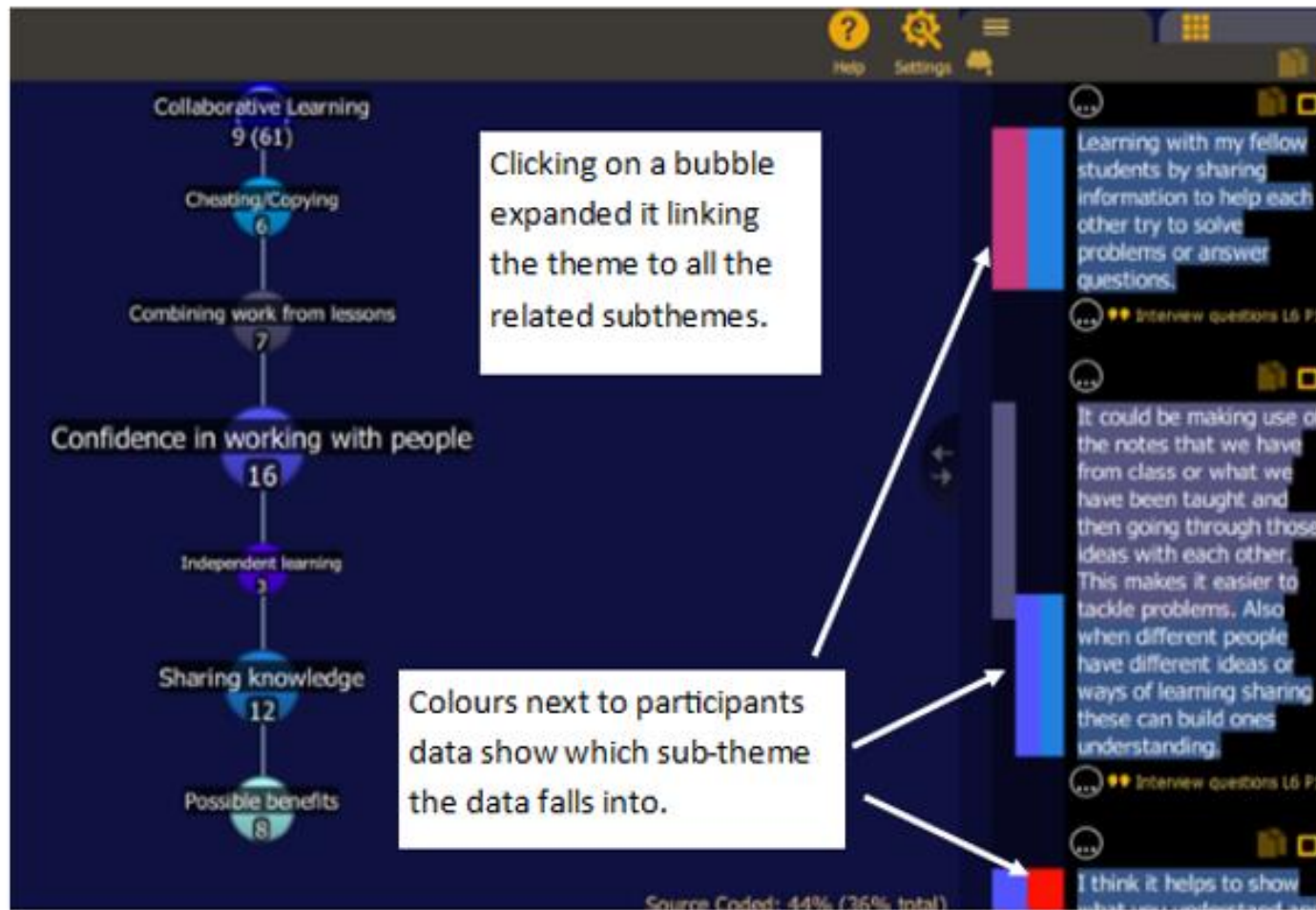
Each code/theme had a different coloured bubble.

Beneath the CL theme you can see the sub-themes.

This area contains the interview transcript of a participant as transcribed into a word document.

Coloured highlight shows which theme highlighted text is in and sorted into that bubble.

Figure F3 The expanded view of a theme linking it to the sub-themes



Appendix G

This contains copies of the initial a priori themes, redefined a priori themes from after the questionnaire analysis and final redefinition of the a priori themes.

Appendix G – a priori themes:

This contains copies of the initial a priori themes, redefined a priori themes from after the questionnaire analysis and final redefinition of the a priori themes.

Figure 6.6a – Initial a priori themes and subthemes

Higher level Theme	Collaborative Learning	Innovation in learning	Collaborative Learning Platforms
Sub Themes	Working in a group	Using IT	Preconceptions
	Learning	Discussions using IT	What should they contain
	Sharing knowledge		

Figure 6.10.1a – Refined a priori themes for interview data

Higher level Themes	Sub-themes					
CL	Working in a group	Learning	Sharing knowledge	Cheating	Confidence	Positives/Negatives of CL
Using ICT/ technology in learning	Uses	WhatsApp/Facebook/ Social media	Collaboration	Positives/ Negatives		
Innovation in learning	Learning	ICT/Technology				
CLP	Preconceptions	Reactions	Contents	Aided/Benefitted learning		
Professional implications	Teaching and learning	Improvements	Changes			

Figure 6.10.2a – Final Template for analysis

Higher level Themes	Sub-themes					
CL	Working in a group	Learning	Sharing knowledge & social interaction/communication	Cheating	Confidence	Positives/Negatives of CL
Using ICT/technology in learning	Uses	WhatsApp/Facebook/ Social media	Collaboration	Positives/Negatives		
Innovation in learning	Learning	ICT/Technology				
CLP	Preconceptions	Reactions	Contents	Aided/Benefitted learning		
Professional implications	Teaching and learning	Improvements	Changes			
Confidence of pupils	Positive factors	Negative factors				
Language	Basic	Complex explanations	Positive	Negative		