



ASSIGNMENT DETAILS AND FEEDBACK

SOUTH WEST WALES CENTRE FOR TEACHER EDUCATION

Sections marked with * should be completed by module lead

Student name:	Laura Sparkes	Student P number:	1700361
Programme: *	PGCE Primary		
Module: *	The Enquiring Teacher	Module Level (6 or 7):*	7
Module code: *	M7X2152	Contribution to Overall Module Assessment (%): *	100%
Module Lead:*	Catherine Morgan		
Assignment Title:*	Write a critical and analytical essay that discusses your practitioner research 'lesson study' in relation to a chosen field.	Assignment No (x of x):*	1/1
Start date:*	09/01/18	Submission deadline:*	16/04/18
Return date of provisional marks & written feedback:*			

Referencing:	In the main body of your submission you must give credit to authors on whose research your work is based. Append to your submission a reference list that indicates the books, articles, etc. that you have read or quoted in order to complete this assignment (e.g. for books: surname of author and initials, year of publication, <u>title of book</u> , edition, publisher: place of publication).		
Submission:	All assignments must be submitted to Turnitin unless otherwise instructed by the Lecturer. Note: the Turnitin version is the primary submission and acts as a receipt for the student. Late submission of the electronic version of the assignment will result in a late penalty. Penalties for late submission: Up to one week late, maximum grade D. Over one week	Date:	16/04/18

	late, Refer. Only the Extenuating Circumstances Panel may grant an extension.		
Module lead to tick to indicate if a hard copy version of the assignment must be submitted.*			YES
			S
			NO ✓

Learning Outcomes tested (from module syllabus)	Assessment Criteria: To achieve each outcome a student must demonstrate the ability to:
•Design and apply appropriate research methodologies demonstrating a critical understanding of the nature of educational research •Conduct a small scale research enquiry to improve an aspect of personal practice and learner outcomes, showing some originality and rigour in the application of appropriate research skills •Critically evaluate research evidence, showing sound judgement of complex data to support pedagogic decisions	• Discuss the intended professional data collection justifying its suitability and purpose; • Support the study by referring to a range of relevant literature; • Integrate theory and practice with regard to the pedagogic context; • Undertake a critical evaluation of the study; • Discuss the ethical issues that should be considered during the study

•Critically reflect upon the importance of ethical procedures within classroom based research, and apply these procedures appropriately	• Write a well-structured piece of work in a coherent writing style
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TASK DESCRIPTION

Write a critical and analytical essay that discusses your practitioner research 'lesson study' in relation to a chosen field.

This should be 6000 words in length.

Further details regarding the structure of the work will be available on Moodle.

You will also be required to submit an Ethics Form as part of the assessment of this module. This will be submitted on the 28th February.

GUIDANCE FOR STUDENTS IN THE COMPLETION OF TASKS

NOTE: The guidance offered below is linked to the assessment criteria overleaf.

1. Subject Knowledge and Understanding (which includes using research-informed literature and knowledge and understanding of the subject)

Your work must be informed and supported by scholarly material that is *relevant* to and *focused* on the task(s) set. You should provide evidence that you have accessed a wide *range* of sources, which may be academic and/or governmental; these sources may include academic journal articles, textbooks, current news articles, organisational documents, and websites. You should consider the *credibility* of your sources; academic journals are normally highly credible sources while websites require careful consideration/selection and should be used sparingly. Any sources you use should be current and up-to-date, mostly published within the last five years or so, though seminal/important works in the field may be older. You must provide *evidence* of your research/own reading throughout your work, using in-text citations in the main body of your work and a reference list that is alphabetical at the end of your work. Please use the Harvard referencing system.

Your work must demonstrate the growing extent of your knowledge and understanding of concepts and underlying principles associated with the subject area. *Knowledge* relates to the facts, information and skills you have acquired through your learning. You demonstrate your *understanding* by interpreting the meaning of the facts and information (knowledge). This means that you need to select and include in your work the concepts, techniques, models, theories, etc. appropriate to the task(s) set. You should be able to explain the theories, concepts, etc. meaningfully to show your understanding. Your mark/grade will also depend upon the *extent* to which you demonstrate your knowledge and understanding; ideally each should be complete and detailed, with comprehensive coverage.

2. Intellectual Skills (Analysis)

Your work must contain evidence of logical, analytical thinking, evaluation and synthesis. For example, to examine and break information down into parts, make inferences, compile, compare and contrast information. This means not just describing what! But also justifying: Why? How? When? Who? Where? At all times, you must provide justification for your arguments and judgements. Evidence that you have reflected upon the ideas of others within the subject area is crucial to you providing a reasoned and informed debate within your work. Furthermore, you should provide evidence that you are able to make sound judgements and convincing arguments using data and concepts. Sound, valid conclusions are necessary and must be derived from the content of your work. There should be no new information presented within your conclusion. Where relevant, alternative solutions and recommendations may be proposed.

3. Pedagogic and Professional Applications (Practical Application and Deployment)

You should be able to demonstrate how the subject-related concepts and ideas relate to pedagogic situations or a particular education context. How do they work in practice? You will deploy models, methods, techniques, and/or theories, in that context, to assess current situations, perhaps to formulate plans or solutions to solve problems, some of which may be innovative and creative. This is likely to involve, for instance, the use of pedagogic examples and cases, the application of a model within relevant educational context. You should show awareness of the limitations of concepts and theories when applied in particular educational contexts. Your work must provide evidence of the attributes expected in professional practice. This includes demonstrating your individual initiative and/or collaborative working. Where relevant, you should show awareness of any ethical issues that relate to your discussion.

4. Key Transferable Skills (Skills for Professional Practice)

You must communicate effectively in a suitable format, which includes written and oral presentation. Work should be coherent and well structured in presentation and organisation.

MARKING CRITERIA AND STUDENT FEEDBACK

This section details the assessment criteria. The *extent* to which these are demonstrated by you determines your mark. The marks available for each criterion are shown. Lecturers will use the space provided to comment on the achievement of the task(s), including those areas in which you have performed well and areas that would benefit from development/improvement.

Common Assessment Criteria Applied	Grade awarded
1. Subject Knowledge and Understanding (which includes using research-informed literature and knowledge and understanding of the subject) Extent of research and/or own reading, selection of credible sources, application of appropriate referencing conventions. Extent of knowledge and understanding of concepts and underlying principles associated with the discipline.	
2. Intellectual Skills (Analysis) Analysis, evaluation and synthesis; logic, argument and judgement; analytical reflection; organisation of ideas and evidence	
3. Pedagogic and Professional Applications (Practical Application and Deployment) Deployment of pedagogic methods, materials, tools and techniques; application of concepts; formulation of innovative and creative solutions to solve problems. Attributes in professional practice: individual and collaborative working	

4.Key Transferable Skills Deployment of appropriate media; presentation and organisation.	

Assignment Grade (Assessment grades are subject to ratification at the Exam Board. These comments and marks are to give feedback on module work and are for guidance only until they are confirmed.)	Late Submission Penalties (tick if appropriate)		
	Up to 1 week late	D Max	
	Over 1 week late	Fail	

Level 7	Assessment Criteria Descriptors for Primary PGCE with QTS This format emphasizes the holistic nature of judgements to be made by markers. Equal weighting is given to each section. Plagiarism or non-submission will result in F (0%) grading.				
Assessment Criteria	Fail - grade E	Weak pass– grade D	Pass – grade C	Pass – grade B	Pass – grade A
	Poor	Weak Pass	Satisfactory	Good	Excellent
Overall judgement	Poor understanding, unsystematic, incomplete and/or inaccurate	Understanding of main issues demonstrated	Satisfactory understanding demonstrated with satisfactory analysis	Good understanding of basic principles and relevant evidence, with a coherent and logical argument	Highly thoughtful answer informed by wider reading, showing clarity of thought, personal insight and some originality
Subject Knowledge and Understanding	Basic misunderstanding, misconceptions, or misinterpretations - Some superficial knowledge in places	Main concepts understood with limited evidence of critical insight	Sound understanding of concepts and critical engagement with ideas	Good understanding of key concepts; knowledge of wider implications; critical engagement	Engaged critically and systematically with the main concepts and theories: excellent engagement
(Conceptual)	Poor and/or inappropriate literature, lacking accuracy, unsound, limited/dated range of sources	Satisfactory range of reading overall although this may be limited in some way	Satisfactory range of reading drawn from the recommended list and other sources	Good range of relevant literature from a variety of sources beyond recommended list	Clear evidence of independent thinking informed by a selective range of reading from a variety of sources
(Reading)					
Intellectual skills	Little sense of an argument lacks coherence. Generally descriptive or anecdotal	Argument is balanced with some differing viewpoints presented. Some questioning of assumptions	Argument presented shows satisfactory evidence of critical and analytical reflection.	Strong argument developed. Good evidence of critical and analytical reflection	A well-structured critical argument is presented with evidence of synthesis of viewpoints
(argument)					
(professional data collection: research design/data collection)	<i>Professional data collection is inappropriate/ flawed /not discussed</i>	<i>Professional data collection is mainly suited to purpose; beginnings of critical considerations</i>	<i>Professional data collection is suited to purpose and considered critically.</i>	<i>Professional data collection well suited to purpose, justified with clear identified focus</i>	Professional data collection logical and sophisticated; comprehensive understanding of appropriate techniques
(presentation of findings/analysis)	Findings presented with little or no framework or discussion; or discussion of findings is descriptive. Few conclusions are drawn or conclusions drawn are inappropriate.	Findings are presented with basic analysis and some limited but appropriate conclusions	Findings presented with some analysis and criticality with justified conclusions	Findings presented in a critical and analytical framework. Thoughtful conclusions, firmly based upon the evidence presented	Findings presented in a critical and analytical framework. Insightful conclusions, firmly based upon the evidence presented
(critical /reflective evaluation)	Little or no evaluation attempted; no or limited reflection	Evaluation and reflection is present but may be limited	Satisfactory critical evaluation of study; satisfactory reflection	Good critical evaluation of study; good reflection	Critically reflective evaluation of work informed by excellent reflection.
Pedagogic and Professional applications	Little or no evidence of engagement or superficial engagement and understanding with respect to the pedagogic and professional context(s)	Some engagement and understanding with respect to the pedagogic and professional context(s)	Sound engagement and understanding with respect to the pedagogic and professional context(s)	Good evidence of integration of theory and practice with respect to the pedagogic and professional context(s)	Excellent integration of theory and practice with respect to the pedagogic and professional context(s)
(linking theory to practice)					
(professional reflection)	No evidence of reflection	<i>Some evidence of reflection whilst beginning to make links with own practice and thinking</i>	<i>Satisfactory evidence of critical reflection whilst beginning to make links with own practice and thinking</i>	<i>Good evidence of critical reflection whilst making links with own practice and thinking</i>	Demonstrates an excellent level of understanding of critical reflection as a learning process
(working in a group)	<i>Inability to work with others or works within a group but lacks self direction or group responsibility</i>	<i>Responsibility for planning and developing courses of action; shows awareness of group responsibility</i>	<i>Initiates and occasionally leads tasks/processes for own work and where appropriate for others.</i>	<i>Chooses goals and can self-direct; able to co-operate within a group and can take the lead</i>	<i>Accepts accountability for determining and achieving personal and/or group outcomes</i>
(ethical conduct where appropriate)	Ethical issues not or superficially considered	Some awareness of ethical issues	Appropriate ethical issues raised and discussed; bias/prejudice not noted	Good, clear understanding of ethical issues; awareness of bias and prejudice	Ethical issues have been addressed effectively; bias/prejudice discussion includes attempts to nullify this
Key/Transferable Skills	Poor presentation of written work	Presentation of written work is weak	Satisfactory presentation of written work	Good presentation of written work	Excellent presentation of written work
(presentation)					
(spelling, punctuation and grammar)	Significant errors in spelling, punctuation or grammar	Some errors in spelling, punctuation or grammar	Spelling, punctuation and grammar are satisfactory; few errors in written language	Spelling, grammar and punctuation are good; very few errors in written language	Excellent standard of written language. No or very minor errors in written language
(structure)	Poor structure with unclear writing style	Structure is present but may be underdeveloped, writing style is mostly coherent	Satisfactory structure with coherent writing style	Good structure with a coherent writing style	Effective structure and highly coherent writing style which fully engages the reader
(referencing techniques)	No use or limited use of protocols and conventions including Harvard referencing	Some following of protocol and conventions of Harvard referencing	Satisfactory use of Harvard referencing protocols and conventions	Good use of Harvard referencing protocols and conventions	Harvard system used accurately, consistently and effectively with all sources

Student Self Evaluation Form

This section repeats in brief the common assessment criteria detailed on previous pages. The *extent* to which these are demonstrated by you determines your mark. Using these criteria, tick the box that best indicates the level of

Common Assessment Criteria Applied	REFER		D	C	B	A
	OUTRIGHT FAIL	UNSATISFACTORY				
1. Subject Knowledge and Understanding (which includes using research-informed literature and knowledge and understanding of the subject)	☐	☐	☐	☐	☐	☐ ✓
2. Intellectual Skills (Analysis)	☐	☐	☐	☐	☐ ✓	☐
3. Pedagogic and Professional Applications (Practical Application and						☐
Deployment)	☐	☐	☐	☐	☐	☐ ✓
4. Key Transferable Skills	☐	☐	☐	☐	☐	☐ ✓
I conducted extensive research through varying methods of literature in order to critically analyse and convey my findings. The key points I have made are clear and outline my findings in a professional way.			To develop: linking my work and maintaining a central theme throughout.			
Student's Name	Laura Sparkes			Date	13/04/18	
Student's Signature	L.Sparkes					

achievement you feel you have achieved with regard to each of them.

***The Enquiring Teacher: Does the use of ICT within a
Key Stage Two Classroom Affect Learner
Engagement?***

Laura Sparkes - 1700361

Word Count - 6,600

1.0 Introduction

1.1 Aims, Focus and Purpose

Teaching and learning through information and communication technology (ICT) is of growing prevalence within classrooms both over Wales and the world alike (Sang *et al.*, 2010). During my Professional Teaching Experience (PTE) I was provided with the opportunity to use ICT within the classroom. Additionally, I experienced the breadth and depth of ICT use. ICT is used within a broad range of contexts within the classroom, from providing additional support for learners to working as a reward for learners upon achieving personal targets. This broad range of use, accompanied by the encouragement of Welsh Government to increase the use of ICT within the classroom ignited a keen interest into ICT use and its effects on learners. Upon utilising ICT within my own teaching, I began to consider how the use of ICT within the classroom environment is affecting learners specifically in terms of engagement. Therefore, the aim, focus and purpose of this research is to consider the effects of ICT use on learner engagement and offer recommendations for myself and others as practitioners to encourage professional development.

1.2 Context of the Research

A large contributor in the decision to partake in this area of research was the upcoming curricular reform. Wales is currently undergoing a time of significant change in regard to the curriculum. Donaldson (2015), made several recommendations for Wales one of which placed a large focus on the role of ICT within the classroom, the Digital Competency Framework. The digital competency framework has already been implemented in many schools and the drive for not only Welsh education, but education around the world is continuing to place a significant focus on ICT. Furthermore, it has been suggested that ICT including ipads, tablets and various other devices will continue on to replace textbooks (Horrigan, 2009; Ochola *et al.*, 2013).

With the above Welsh Government stance and a view to improve my own professional standards I began to work corroboratively with a fellow trainee teacher to gain a better understanding of the topic and the research we would need to conduct. Corroboratively my partner and I made the decision to investigate the effects of ICT use on learner engagement

within the Key Stage 2 classroom. Myself and fellow researcher chose to place a focus on ICT and the effects of our implementation methods on the engagement of learners with ICT. Specifically, within our classroom this referred to the level of engagement demonstrated by individual learners when a task was completed using ICT. We believed this would provide us with an opportunity to evaluate our own practices with ICT and determine the most effective practices. Our research was conducted within School X, an urban school on the outskirts of Swansea catering to around 210 learners from ages three to eleven. We conducted our research within a year 5/6 classroom of twenty-five learners (thirteen male, twelve female) all ranging in ages from 9-11. The class was supported by one teaching assistant throughout all sessions during the school day, with both myself and my fellow researcher leading a lesson.

2.0 Overview of Literature

Before we begin to discuss the research, it is of significance to discuss what is currently understood regarding ICT and engagement within the body of literature thus far.

ICT has been deployed within classroom environments for decades and a positive correlation has been found between the use of ICT and learner engagement (Nelson *et al.*, 2005; Chen *et al.*, 2010; Diemer *et al.*, 2012). Furthermore, several studies have demonstrated an association between learner engagement and improved learning (Schraw & Lehman, 2001; Carini *et al.*, 2006; Harper & Quaye, 2009; Axelson & Flick, 2011; Diemer *et al.*, 2012; Reeve & Lee, 2014). Learner engagement plays a pivotal role in education today and it proves difficult to comprehend how a system which overlooks and lacks learner engagement can produce positive outcomes (Gunuc & Kuzu, 2015). Literature reports that learner engagement and learning achievement form a positive relationship (Coates 2005; Park 2005; Carini *et al.*, 2006). Therefore, leading to the conclusion that learner engagement is of considerable significance for learning, performance, retention, motivation and achievement (Gunuc & Kuzu, 2015). Furthermore, learner engagement has significant implications for learner's socialisation and wellbeing (Lewis 2010; Li *et al.*, 2010; Trowler & Trowler 2010; Gunuc & Kuzu, 2015). Engagement as a concept consists of four distinct, inter-correlated reciprocally supportive facets; behaviour, cognition, emotion and agency (Christenson *et al.*, 2012; Fredricks *et al.*, 2004; Reeve, 2013; Reeve & Tseng, 2011; Skinner *et al.*, 2009a). Behavioural engagement refers to the level of involvement of the learner in terms of the amount of effort invested into the learning activity with specific regards to attention, endeavour and persistence (Skinner *et*

al., 2009b). The demonstration of positive emotions during learning activities such as interest refer to emotional engagement (Skinner *et al.*, 2009b). Cognitive engagement refers to the learning strategies implemented by the learner which demonstrate sophisticated attempts at learning as opposed to superficial learning strategies (Walker *et al.*, 2006). Finally, agentic engagement refers to the learner's contribution to the instructions they receive in the form of question asking and preference expression (Reeve, 2013). Learner engagement is an area of significant importance as it functions as a pathway which connects the motivational states of learners with the desired educational outcomes (Skinner *et al.*, 2009a; Skinner *et al.*, 2009b; Hughes *et al.*, 2012; Jang *et al.*, 2012; Ladd & Dinella, 2009; Reyes *et al.*, 2012; Reeve & Lee, 2014). In summary, the ability for a learner to become engaged enthusiastically, strategically and proactively provides learners with multiple pathways to increasing individual attainment, educational goals and wellbeing (Reeve & Lee, 2014).

As aforementioned a direct correlation has been found between the use of ICT and engagement in the classroom. An example of ICT resulting in increased engagement was demonstrated within a study carried out by Passey *et al.* (2003). Passey *et al.* (2003) demonstrated the correlation between ICT use and learner engagement within the classroom. Learners exhibited increased motivation as a result of using ICT in the classroom, in addition to demonstrating an improved attitude towards school life and academic work as a whole (Passey *et al.*, 2003). Furthermore, ICT can support the learning of more complex processes therefore fostering more effective learning environments and operating as an architect of active learning and higher-order thinking (Alexander, 1999; Jonassen, 1999; Smeets, 2005).

However, it has been suggested that the type of ICT use within the classroom is of importance (Harrison *et al.*, 2002; Smeets, 2005). The use and selection of ICT by practitioners has been found to have a significant effect on the learning environment leading to the practitioner's skills having a further significant effect (Smeets *et al.*, 1999; Veen, 1995; Jedsokog & Nissen, 2004; Smeets, 2005; Sang *et al.*, 2009; Diemer *et al.*, 2012). Additionally, access to ICT is influential, both practitioners and learners require access to ICT be able to adequately implement it within the learning environment and to allow the construction of effective learning environments (OTA, 1995; Kennewell *et al.*, 2000; Smeets 2005; Diemer *et al.*, 2012). Moreover, Kennewell *et al.* (2000) suggested that ICT placement was of equal importance as the ICT provision available. ICT opportunities and interaction are maximised when ICT is present within the learning environment as opposed to being housed in an alternative location (e.g. computer

room) (Kennewell *et al.*, 2000). In addition, the pedagogical perspectives of practitioners combined with their interpretations of the contribution of ICT to the learning environment produces a significant effect on how they implement ICT within the classroom (Drenoyanni & Selwood, 1998; Higgins & Moseley, 2001; Hokanson & Hooper, 2000; Niederhauser & Stoddart, 2001).

ICT use within the classroom has been found to increase learner engagement and construct effective learning environments (Nelson *et al.*, 2005; Smeets, 2005; Chen *et al.*, 2010; Diemer *et al.*, 2012). However, there are a myriad of other factors which effect the use of ICT within classrooms which include accessibility, practitioner preferences, placement, practitioner perspectives and practitioner skills (Smeets *et al.*, 1999; Veen, 1995; Kennewell *et al.*, 2000; Jedeskog & Nissen, 2004; Niederhauser & Stoddart, 2001).

3.0 Methodology

3.1 Lesson Study Design

Due to the collaborative nature of our research the approach taken was that of action research. Action research is often referred to as practitioner-based research and offers a valuable opportunity for enhancement at a local level (McNiff, 2002). Action research is invaluable as it offers an opportunity to provide change where it is necessary to achieve a desired or improved outcome (Lewin, 1946; Bassey, 1998). Furthermore, Hopkins (1985) suggested that action research is a combination of action and research that defines action as a form of rigorous enquiry, within which an attempt is made to understand, reform and improve personal practice. Additionally, literature concurs that action research is an invaluable tool for improving practice (Ebbutt, 1985; Cohen *et al.*, 2002). With the concept of reforming and improving practice in mind, and the hope to develop as practitioners an action research approach was taken. More specifically, within the scope of this assignment a lesson study approach to the research was planned and implemented. A lesson study approach consists of practitioners working collaboratively to develop, plan, teach and observe a lesson. This leads to data collection on several aspects of the lesson including learner engagement, learning, and enjoyment, in addition to learner response to practitioner strategies. The process of conducting a lesson study approach therefore allows practitioners to refine their practice. The process ultimately results in practitioners becoming more aware of effective practice and thus improving learning

outcomes for learners (Stepanek *et al.*, 2006). Furthermore, a lesson study approach offers a context for investigating content. Practitioners gain a deepened understanding as well as an intelligence of how topics scaffold and construct together. Practitioners are afforded an opportunity to evaluate and reflect on the curriculum, teaching methods and materials. Additionally, they collaborate on how to transform their own content knowledge into pedagogical content knowledge which is more accessible to learners. The first stage within the lesson study approach required the collaborative setting of goals which would guide our work (Lewis, 2000). These goals included; using ICT to increase learner engagement; using observation strategies to collect data and information on learning and engagement and make revisions and improvements to a lesson in order to promote effective practice and maximise learning. The second element of the lesson study approach involved planning the lesson. Planning was a collaborative event between myself and my partner and resulted in a shared research lesson plan (appendix 1). The lesson plan consisted of an introduction, main task and plenary and aimed to place a significant focus on the use of ICT. Thirdly, came teaching, observing and debriefing. This element consisted of one member of the research party teaching the pre-planned lesson whilst the other member observed teaching and collected and recorded data, the specific observation and data collection methods used will be discussed below (section 3.2). Additionally, the observations made were discussed during the debriefing and any additional comments were made. Fourthly, the revising and reteaching element of the study. Within this element the discussed alterations were implemented, an improved lesson plan was produced (appendix 2) and any revised observation or data collection methods were made. The final element of the research study approach is reflecting and sharing results. Within this element of our approach we made final reflections and recommendations in order to develop and progress as practitioners.

3.2 Observation Methods & Data Collection

As previously stated the lesson study research approach consisted of five distinct stages; setting goals, planning the lesson, teaching, observing and debriefing, revising and reteaching and finally reflecting and sharing results. Within this section we will focus on the observing and debriefing element of the approach and discuss the methods implemented including observation techniques and methods of data collection. The observation approach focused on a naturalistic method. This approach has been stated to lend itself well to studying learners within their natural setting and was not a method which required the utilisation of specialist training or resources (Holloway, 1997). Furthermore, it was decided that a naturalistic

observation approach would afford the best methodology to observe the effectiveness of ICT implementation on the participants (Cohen *et al.*, 2013). Within a naturalistic observation approach there are further specific observation methods. For the purposes of this research the researchers observed as overt, non-participant observers. An overt observer is an individual of whom has made their intentions known to the participants, the participants are aware they are under observation (Cohen *et al.*, 2013). The decision to observe overtly was directly correlated with the non-participant observation method implemented. As both myself and fellow researcher observed as non-participants and the gaining of assent was necessary from participants, it was essential that we were overt in our intentions to observe. Furthermore, a non-participatory approach was selected as we felt observing as participants could have influenced changes in the behaviour of the participants therefore negatively impacting on the reliability and accuracy of the behaviours observed (Gunuc & Kuzu, 2015).

There are a wide variety of ways in which researchers within educational research collect and record data. The specific methods selected are often determined by the form of data researchers wish to collect. Within the scope of this research we opted to collect multiple forms of data in an attempt to gather as much evidence as possible to support in answering our research question. Baumfield *et al.* (2012) stated that a multi-method approach is beneficial to researchers and often makes data collection more manageable as data which would be ordinarily collected can also inform research. Furthermore, it provides researchers with a broader reservoir of evidence from which to draw conclusions (Baumfield *et al.*, 2012). Firstly, we will discuss the methods implemented in order to obtain qualitative data. The qualitative data obtained was collected through instantaneous time sampling. This process consisted of firstly determining which behaviours would be included within the observation schedule (Figure 1). The behaviours selected were indicative of high and low engagement and to select these behaviours a small review of literature and engagement scales was conducted. Considering the aims of our research we chose to focus on Leuven scale of engagement as this is a well-known and frequently implemented scale of engagement. Furthermore, the behaviours were selected to represent the four areas of engagement behavioural, emotional, cognitive and agentic (Christenson *et al.*, 2012; Fredricks *et al.*, 2004; Reeve, 2013; Reeve & Tseng, 2011; Skinner *et al.*, 2009a). Secondly, a time scale was discussed, and it was determined each participant would be observed every ten minutes and a tally made of the behaviour exhibited. It was felt that this would allow a suitable time period to elapse within which the behaviour of all participants could be accurately identified and recorded.

Low Engagement Chart

	Child 1 HA	Child 2 HA	Child 3 MA	Child 4 MA	Child 5 LA	Child 6 LA
Doodling						
Off topic conversation						
Fiddling						
Staring						
Distracting others						
Shouting						
Not on task						

High Engagement Chart

	Child 1 HA	Child 2 HA	Child 3 MA	Child 4 MA	Child 5 LA	Child 6 LA
On Topic conversation						
Concentrating on the task						
Enthusiasm (Showing excitement when playing)						
Asking questions						
Answering questions appropriately						
Eager to join in. (initial reaction)						

Figure 1. Observation schedule used to collect data on learner behaviour.

In addition to collecting quantitative data in the form of instantaneous behavioural sampling interviews were conducted to collect qualitative data. Interviews have been deemed useful tools within educational research. Several studies have used interviewing as a method of gaining a deeper understanding of learner views and perspectives (Kuh, 2005; Diemer *et al.*, 2012; Wilkinson & Barter, 2016). Participants were interviewed following the research lesson as a means of determining their views on the use of ICT within the classroom and to establish their perceptions of engagement and the effects ICT had on this. The interviewing method implemented was semi-structured interviewing. This method was selected as it occurred frequently within the literature was stated to provide researchers with an in-depth understanding of participants views and experiences (Wilkinson & Barter, 2016).

Finally, the sampling method. The sampling method used within this research was a non-probability sampling method. A non-probability sampling method involves selecting a sample

based on the subjective judgement of the researcher and dismisses the notion of random sampling (Ross, 2005). The specific method of non-probability sampling used was that of judgement sampling. Judgement sampling consists of selecting the sample based on knowledge and professional judgement. This method of sampling allowed the selection of participants from each attainment group, therefore allowing a representative sample within the classroom. Additionally, this method of sampling was implemented by Kuh (2005) and Parker *et al.* (2008) of whom undertook similar research and therefore were used as a model upon which our research was based.

3.3 Ethical Considerations

Educational research is an area of which provides several ethical considerations mainly focusing around the nature of children as participants within observational research. Firstly, we will discuss the ethical considerations in relation to the rights of participants. Participants in any research are entitled to the protection of the following four rights; the right to maintain privacy, the right to guaranteed anonymity, the right to guaranteed confidentiality and the right to be kept from harm, betrayal or deception (Govil, 2013). Within our research there is no risk or harm, betrayal or deception. However, considerations and measures have been put in place to ensure that the privacy, anonymity and confidentiality of participants are protected in accordance with the guidelines provided by BERA (2004), Unicef (1989) & P.C.T (1998). The measures enacted include omitting any personal or identifying information from data collection and subsequent report writing. For this reason, all participants will be referred to as Child (1, 2, 3 etc.). Furthermore, in accordance with the aforementioned guidelines consent required consideration as all of the participants were minors. For this reason, informed consent was gained from the parents of all participants through a written consent form (appendix 3) and further assent was gained from the participants in the form of a simplified assent form (appendix 4). Before partaking in any educational research all suggested research and methodology was submitted to the University of Wales Trinity St David ethics committee (appendix 5). Upon approval of this form and all of the ethical considerations of which it included the research was deemed ethical and permitted to be undertaken.

4.0 Lesson Study and Analysis

Within this section we will discuss the research lessons in terms of learner and practitioner goals, potential improvements and knowledge gained.

4.1 Lesson A

Firstly, we will discuss learner goals within the numeracy lesson. Prior to embarking upon the research lesson, the goals set out before learners were thoroughly considered. Additionally, they were reflected upon throughout the lesson and lesson study process. The main goals for learners were to develop and improve mental strategies for solving multiplication problems, in addition to, developing their familiarity with the times tables. Consequent to thorough reflection we conclude that the goals were achieved by the learners in several ways. Firstly, the primary goal of improving mental strategies for solving multiplication problems and developing familiarity with the times tables was achieved. We are confident that these goals were achieved by the recall received by the practitioner during the lesson plenary (appendix 1). The plenary consisted of a short recall task by which learners were required to provide the answer to a simple multiplication or times tables question (e.g. 2×8 ?, four, fours?, $? \times 3 = 21$), the answers given during this short recall task were mentally assessed against the answers given during the introduction. Furthermore, the speed and confidence with which learners offered responses to questions was also observed. From comparing the answers and fluency of answers received during the introduction and plenary it was evident that a majority of learners had successfully achieved the lesson goals and developed mental multiplication strategies and familiarity with the times tables.

Although the lesson was generally considered successful due to the learner's achievements of predetermined goals there were areas for improvement. Firstly, the introduction, the introduction for Lesson A focused around the use of white boards and white board markers to submit answers as individuals. Although this element of the lesson involved the indirect use of ICT (as the questioned being asked were asked via the white board) this element did not appear particularly engaging to the learners and therefore may have had an adverse effect upon the remainder of the session. Full engagement with a learning activity requires learners to demonstrate engagement in all four of the, inter-correlated reciprocally supportive facets; behaviour, cognition, emotion and agency (Christenson *et al.*, 2012; Fredricks *et al.*, 2004; Reeve, 2013; Reeve & Tseng, 2011; Skinner *et al.*, 2009a). However, it became apparent

during the introduction that a number of learners were not demonstrating full engagement and in fact appeared, to a degree, disengaged. Correspondingly, learners expressed the opinion that the introduction to Lesson A could have been improved by being made more interactive (appendix 6). An introductory activity which fails to engage learners can be of significance as literature states that a demonstration of disengagement during the initial element of the lesson could have led to engagement issues during the focused task (Schussler, 2009). Therefore, the lesson was improved by altering the introduction to an activity which encouraged higher engagement than the original introduction thereby eradicating any disengagement issues which may have possibly occurred during Lesson A. The improved introduction incorporated both ICT and a competitive recall structure to encourage engagement of all four facets (appendix 2).

Upon commencement of the main task all learners exhibited behaviours indicative of high cognitive, behavioural, emotional and agentic engagement. This demonstration of high engagement amongst the learners remained consistent for a large portion of the lesson. However, as time progressed several learners began to demonstrate behaviours indicative of low engagement including off topic conversation, fiddling, and shouting (Figure 2). This suggested that although the use of ICT was initially engaging emotionally, behaviourally, cognitively and agentially, the novelty of interacting with the ICT wore off resulting in a lower level of engagement from learners. However, the learners were assigned a program to complete the learning activity on. During the interviews held subsequent to the lesson learners reported that they would have preferred to be given the opportunity to select the software themselves. Suggesting that by determining which application the participants were to use the learning activity became over prescribed.

Low Engagement Chart

	Child 1 HA	Child 2 HA	Child 3 MA	Child 4 MA	Child 5 LA	Child 6 LA
Doodling						
Off topic conversation	II	II	I	I	II	
Fiddling	I	I				II
Staring						
Distracting others						
Shouting		I (atg)	I (atg)	II (atg)	I (atg)	I (atg)
Not on task	I (wse)	I (wse)				I

High Engagement Chart

	Child 1 HA	Child 2 HA	Child 3 MA	Child 4 MA	Child 5 LA	Child 6 LA
On Topic conversation	II	II	III	III	II	II
Concentrating on the task	III	III	IIII	IIII	IIII	II
Enthusiasm (Showing excitement when playing)	I	II	II	II	I	II
Asking questions	I	I	II	I	I	I
Answering questions appropriately	I		I			
Eager to join in. (initial reaction)	I	I	I			I

Figure 2. Behavioural observations made during Lesson A.

The methods of data collection used provided us, as researchers, with sufficient data and information to assess the achievement of goals of learners and of teaching. We were able to collect data which demonstrated the engagement of learners throughout the lesson at specific time intervals. This allowed us to gain a deeper understanding of how a task which incorporates ICT can retain the engagement of learners within the Key Stage Two Classroom. However, despite the deeper level of knowledge gained the data collection method and the data collection did present some issues for the researcher. Our data collection method of instantaneous time sampling consisted of making a recording of each participants behaviour after a ten-minute time interval. This afforded the researcher a sufficient period of time to make observations of each learner and collect data accordingly. However, recording the behaviour of each learner once in ten minutes resulted in a large amount of behaviours being

exhibited but not recorded as they were not within the observation interval. Therefore, although our data regarding Lesson A offered an insight into the engagement levels of learners whilst completing learning activities on ICT over a sustained time period there are omissions in the behavioural repertoire and the frequency of behaviours which suggest high or low engagement. As researchers we felt it that this omission could significantly affect our data collection and interpretation of effective practice. Upon embarking on the revised research lesson, we altered our method of data collection to event sampling so that any behaviours exhibited during the lesson may be recorded, irregardless of their occurrence within the allocated time interval. This alteration was made to ensure behaviours exhibited were fully documented and future practice could be improved and influenced accordingly for the benefit of learners and practitioners alike.

4.2 Lesson B

The lesson goals set out before the learners remained similar to those set out in Lesson A; develop and improve mental strategies for solving multiplication problems, in addition to, developing in their familiarity with the times tables. However, an additional goal included the selection of appropriate software on which to complete the learning activity. This alteration was made in response to learner feedback and in an attempt to tackle the over prescription of Lesson A. Similarly, to Lesson A the learners were successful in achieving the lesson goals as they selected appropriate software to complete the learning objectives. Furthermore, the learners achieved the aforementioned lesson goals which was demonstrated during the lesson plenary. The plenary, as it proved effective during lesson A in terms of assessment for learning and engagement, was retained during Lesson B. The plenary activity demonstrated that times table recall, and mental multiplication strategies had again improved as a result of the learning activity. Thus, leading to the conclusion of achieved lesson goals.

The lesson was altered to allow learners to select their own application to complete the learning activity. Any application which encouraged the development of mental multiplication strategies and times tables recall was permitted however, the following applications were encouraged; Times table Rock stars, J2ebblast, Topmarks and Number rock. This resulted in an overall high level of engagement throughout the lesson, both during and in between the specific observation intervals (Figure 3). Two of the six participants failed to demonstrate a single behaviour indicative of low engagement, with the remaining learners demonstrating very low instances of low engagement behaviours. Thus, indicating the alteration of the lesson to allow

learners more choice aided in engaging all four facets of engagement within learners. Additionally, during interviewing several participants mentioned their enjoyment over being able to select their own applications and how this helped them remain engaged (appendix 6). Furthermore, the four individuals who demonstrated low engagement behaviours belonged to the lower attainment and higher attainment groups suggesting the low engagement behaviours were demonstrated as a result of the learning activity providing either too large or small a challenge (Bowen, 2005). Therefore, suggesting that although ICT as a starting point for a learning activity encourages high engagement levels across all four of the engagement facets learners also need to be consistently provided with a suitable level of challenge for this level of engagement to be maintained. Additionally, the demonstration of low engagement behaviours often occurred towards the latter end of the learning activity. Therefore, suggesting that although ICT is initially engaging, as established in Lesson A levels of engagement decrease over time and ICT fails to engage all four facets of learner engagement for sustained time period.

Low Engagement Chart

	Child 1 HA	Child 2 HA	Child 3 MA	Child 4 MA	Child 5 LA	Child 6 LA
Doodling		I				I
Off topic conversation	I	I			II	II
Fiddling						I
Staring						
Distracting others						I
Shouting	I (atg)	I (atg)	II (atg)	II (atg)	II (atg)	I (atg)
Not on task	I (wsep)	I (wsep)		I (wsep)		I

High Engagement Chart

	Child 1 HA	Child 2 HA	Child 3 MA	Child 4 MA	Child 5 LA	Child 6 LA
On Topic conversation	III	III	II	II	II	II
Concentrating on the task	III	III	III	III	III	II
Enthusiasm (Showing excitement when playing)	III	II	III	II	III	III
Asking questions	I	II	II	II	I	I
Answering questions appropriately	II		I	II	I	I
Eager to join in. (initial reaction I check)	I	I	I	I	I	I

Figure 3. Behavioural observations made during Lesson B.

Upon revising the lesson for further teaching, the lesson goals would remain as they were achievable for learners and engaged learners, particularly in terms of selecting their own software to complete the learning task. However, in order to ensure the available applications were suitable to the needs and attainment level of each learner a method of levelling the learners on each application would be required. This method could occur through an informal test as an introductory activity or additionally as a mini – plenary within which learners independently attempt levels upon the applications and are encouraged to select the most suitable. Appropriate differentiation through levelling would have the potential to also eradicate any engagement issues associated with time (Bowen, 2005).

Interestingly, during Lesson B due to unforeseen circumstances a participant was forced to share their ICT with another learner. During the post-lesson interview the participant spoke very highly of partaking in this method of collaborative learning stating it gave them the opportunity to share information, validate ideas and problem solve (appendix 6). This offers a significant insight into how learners feel about the use of ICT and what elements of ICT benefit them. Furthermore, the participant discussed finding it easier to concentrate as they were having a break from using the application but were still able to support their peer, therefore, remaining engaged in the activity (appendix 6).

The revised methods of data collection provided an increased depth of view when compared to Lesson A. The ability to include details on behaviour which would have been overlooked in Lesson A allowed a more comprehensive view of the effects of ICT on learner engagement. Furthermore, an increase in the understanding of specific ICT use and its effects on engagement was developed. Despite the insight provided to us as researchers regarding how the use of ICT affects engagement within a Key Stage Two classroom it is of significance to consider the wider implications and applications of this research and how the findings can be shared with others. Under the circumstances within which this research would be repeated changes would be advised. Firstly, our research determines that ICT does encourage engagement of learners however there are several factors which affect the longevity of this engagement. Upon repeating or continuing the research a more focused and specific view would be useful to establish how exactly these factors influence the level of engagement ICT encourages within the classroom. Furthermore, certain controls would need to be more appropriately managed and other lesson elements taken into consideration. As aforementioned some of the behaviours witnessed may have resulted from a lack of differentiation within the lesson. A deeper insight would be gained into specific ICT use if appropriate differentiation for learners was pre-established. Additionally, there were behaviours witnessed which were outside of the observation period during Lesson A and therefore could not be included in the observation schedule, although this issue was addressed when revising Lesson A and the decision to allow continuous observations made, having these additional behaviours included in the observation schedule would have allowed a better understanding of the implications of these behaviours and whether they were indicative of low or high engagement during Lesson A. Finally, an improvement to the study and data collection could have been made by creating an engagement scale. Although our research incorporated behaviours indicative of high or low engagement there was no scale provided upon which a level of engagement could be precisely determined.

Within such scales participants are placed on a level from 1-5 with one indicating low engagement and 5 indicating very high engagement. It is worthy of note that the behaviours selected for the observation schedule used were heavily influenced by behaviours used by authors within engagement scales. However, using the behaviours demonstrated to place learners on a scale of engagement would have been beneficial to our research and produced more applicability and validity (Gunuc & Kuzu, 2015).

5.0 Discussion

Literature has established a link between ICT use within the classroom and increased learner engagement (Nelson *et al.*, 2005; Chen *et al.*, 2010; Diemer *et al.*, 2012). Parker *et al.*, (2008) expressed the strength of the link between ICT use learner engagement. However, Parker *et al.*, (2008) also noted the lack of evidence linking this increased engagement to improved attainment and instead stated that the main benefit of ICT use within the classroom was its encouragement of collaborative learning. Furthermore, Wilkinson & Barter (2016) stressed the importance of ICT in promoting learner engagement through collaborative learning stating the use of ICT within the classroom is likely to promote positive outcomes as a result of increasing learner engagement (Wilkinson & Barter, 2016). This supports the expression of Child 4 that working collaboratively using ICT increased engagement and was an enjoyable experience which promoted vital skills including, communication, problem solving and cooperation. Moreover, during the post-lesson interviews for both Lesson A and Lesson B several of the participants mentioned the desire to complete the learning activity collaboratively as they felt this would further develop their learning. Further supported by Kuh (2005) of whom asserted that collaborative learning aids learners in developing invaluable skills which have immeasurable benefits.

Additionally, all learners reported they thoroughly enjoyed using ICT within the numeracy lesson, felt they developed their learning, and felt they developed skills and a collaborative nature to their learning. Supportingly, literature has suggested that ICT does not only increase learner engagement but also has a significant effect on creating powerful learning environments (Smeets, 2005). It has been further proposed that ICT provides opportunities for learners to access a myriad of information resources and to view information from varying perspectives, therefore cultivating the authenticity of learning environments (Smeets, 2005). Learners also expressed a positive attitude towards the social element of the activity which was fostered by

the use of ICT. Learners stated their enjoyment of the social aspect which involved communicating scores and opinions on the ICT. This supports the literature which states activities which promote learner engagement offer significant benefits in terms of socialisation and wellbeing (Lewis 2010; Li *et al.*, 2010; Trowler & Trowler 2010; Gunuc & Kuzu, 2015).

During the research lesson there were issues identified surrounding the implemented use of ICT. Throughout both research lessons low engagement behaviours were noted although, these decreased during Lesson B. These low engagement behaviours are attributed to a lack of differentiation, poor time management and over prescription of ICT use. However, Wilkinson & Barter (2008) found that despite variations in the use of ICT throughout their research learners consistently reported increased engagement in addition to a positive effect on their learning. Correspondingly, despite the noting of low engagement behaviours all learners reported similar conclusions stating increased engagement and positive learning gains. However, unfortunately, especially in light of the upcoming curricular reform many practitioners use technology within the classroom as it is an expectation. This use often leads to unpurposeful use which lacks in clear aims, objectives and skill building (Parker *et al.*, 2008).

6.0 Conclusion

6.1 Summary of Findings

Much of the literature surrounding the use of ICT within the classroom establishes a link between ICT use and learner engagement (Kuh, 2005; Nelson *et al.*, 2005; Parker *et al.*, 2008; Chen *et al.*, 2010; Diemer *et al.*, 2012; Wilkinson & Barter, 2016). Additionally, increased learner engagement has been found to lead to positive learning attitudes, skill acquisition and greater socialisation and wellbeing (Lewis 2010; Li *et al.*, 2010; Trowler & Trowler 2010; Gunuc & Kuzu, 2015). The ability of correctly implemented ICT to engage learners, create positive learning attitudes and create powerful learning environments has been documented throughout the literature (Kuh, 2005; Nelson *et al.*, 2005; Smeets, 2005; Parker *et al.*, 2008; Chen *et al.*, 2010; Diemer *et al.*, 2012; Wilkinson & Barter, 2016). Supportingly, these abilities were demonstrated within our research. Within the research we established, through careful observation and learner interviews that the use of ICT within the Key Stage Two classroom led to increased learner engagement and learners demonstrating a positive attitude to learning. However, we also established that the success level of ICT within the classroom is dependent

on several factors which should not be overlooked including; time management, collaborative learning, differentiation and prescription we will discuss the recommendations for appropriately addressing these factors within section 7.

6.2 Strengths & Limitations of Research

Research such as that conducted within this paper often has several strengths and limitations relating to validity, applicability and reliability. Before embarking upon the research much time was spent considering and investigating the appropriate research methods to implement which would afford the areas of validity, reliability and applicability strength. The exact research methods implemented can be found in detail within section 3.0 of this paper. However, within this section the strengths and limitations of the methodologies used will be discussed.

We will begin by discussing a pivotal strength of the research, the use of the lesson study approach. The lesson study approach is a heavily implemented tool within the educational community and provides practitioners with the opportunity to inform their own practice as well as others within their professional community. Furthermore, the approach is widely used and praised throughout the world and the five-step process is renowned for its ability to improve practitioner's awareness of effective practice, thus improving learning outcomes for learners (Stepanek *et al.*, 2006). However, despite the strengths afforded to the research by the lesson study design there may have been some validity issues associated with the observational method used. By choosing to overtly observe as a non-participant the participants were acutely aware of the researcher's presence which may have resulted in abnormal behaviours. Individuals of whom are aware they are being observed often find it difficult to behave in a natural manner and therefore there was a potential that the presence of the researcher would have affected the situational outcomes, thus affecting the validity of the research (Cohen *et al.*, 2013). Yet, contrastingly conducting a naturalistic observation provides the research with ecological validity as observations are occurring within the participants natural environment (Cohen *et al.*, 2013).

Furthermore, there are strengths and limitations to the data collection methods implemented within the research. The decision to implement a behavioural schedule was thoroughly researched and the behaviours included were compiled from similar research projects. However, the original, simplistic method of a tally of behaviours presented some difficulties in terms of validity. Using a limited method of recording behaviours such as that implemented

within this research limits the depth of understanding of situations and their interactions (Wallen & Fraenkel, 2001). Furthermore, the choice to only collect data during the research lessons in the form of a behavioural tally limited the information gathered. The main aim of the lesson study approach is to deepen practitioners understanding of effective practice, by choosing to focus slowly on behavioural data a valuable opportunity was missed to collect field notes on other areas of effective practice which did not solely relate to ICT and learner engagement.

The use of semi structured interviews within the research provides a level of validity. Semi-structured interviews involve open ended questions and require participants to demonstrate an understanding of the question and situation within which the question relates to. However, as the participants were children there were potential issues regarding reliability of answers. The participants would have been reluctant to discuss negative attitudes towards the research lesson as they were aware of the investment the practitioners had within the research lesson.

Finally, the main disadvantage of the research relates to applicability. This research was a small-scale research project and whilst the findings are vital in developing and improving the professional development of the researchers the results lack applicability to other scenarios and the sample was too small to be considered a representative sample to inform practice throughout Wales.

7.0 Recommendations

I will now present several recommendations with an aim to inform professional development; Firstly, I recommend that ICT is an invaluable learning tool which can be used to engage learners across all curricular areas. Secondly, I recommend all learning activities which incorporate ICT be considered in terms of time management, collaborative learning opportunities, learner enjoyment and learner ability. In order to fully engage learners with ICT within the classroom it is pivotal to ensure learners are provided with a time period sufficient to promote engagement and enjoyment but not as timely as to encourage boredom. Additionally, particularly whilst using interactive software such as numeracy applications it is vital to ensure learners are given opportunities to work at a level which provides them with sufficient challenge and does not discourage development. Secondly, I recommend that in light of the upcoming curricular reforms in Wales practitioners develop their familiarity with ICT and the skills ICT can be used to develop in learners. Finally, I recommend practitioners

provide learners with ample opportunity to partake in collaborative learning when using ICT as collaborative learning fosters the development of vital skills which are immeasurably valuable to learners both throughout their school years and beyond.

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9.0 Appendices

Appendix 1

Name of Trainee: Laura Sparkes/ Demi Edwards

Session Ref:

Date:

Class: Year 5/6

Number of Learners: 24

Age: 9/10/11

Subject: Numeracy	
Learning Objective: To develop mental multiplication strategies and develop times table familiarity and recall	
Additional Learning Needs: N/A -	
Introduction: Explain lesson aims to learners: Improve mental multiplication strategies Develop time tables recall. Place multiplication/ time tables problems on the IWB Learners to submit answers using white boards and white board markers. Explain to learners that answers are to remain hidden until reveal is said.	<u>Resources</u> White board, white board markers A range of ICT including ipads, laptops and notebooks.
Main Task: Learners to log onto Hwb and access J2e blast Learners to work as individuals through various levels of TT blast. Upon completion of each round learners to record scores and scores to be submitted at the end of the lesson.	
Plenary: Learners to receive a number of rapid fire multiplication questions Hand to be placed up when answer known When a correct answer is given the learner must sit down.	
Links to Previous Learning: Links to previous lessons on multiplication strategies and timestables	
Independent Learning Opportunities: Learners provided with opportunity to independently develop mental multiplication strategies.	
Assessment for learning: Questioning	
Vocabulary: Multiplication, Mental strategies, times tables, recall	
Curriculum Coverage: – Transfer mathematical skills to a variety of contexts and everyday situations – Identify the appropriate steps and information needed to complete the task or reach a solution	

- Select appropriate mathematics and techniques to use
- Choose an appropriate mental or written strategy and know when it is appropriate to use a calculator
- Explain results and procedures clearly using mathematical language
- Recognise, and generalise in words, patterns that arise in numerical, spatial or practical situations
- Read and write numbers to 1 million and numbers to 3 decimal places
- Use mental strategies to recall multiplication tables up to 10 x 10 and use to solve division problems
- Multiply numbers and decimals by a multiple of 10, *e.g. 15 x 30, 1.4cm x 20*
- Identify multiples of numbers up to 10; use the terms multiple and factor
- Identify common multiples of two numbers

LNF:

Literacy:

Numeracy:

- Transfer mathematical skills to a variety of contexts and everyday situations
- Identify the appropriate steps and information needed to complete the task or reach a solution
- Select appropriate mathematics and techniques to use
- Choose an appropriate mental or written strategy and know when it is appropriate to use a calculator
- Explain results and procedures clearly using mathematical language
- Read and write numbers to 1 million and numbers to 3 decimal places
- Use mental strategies to recall multiplication tables up to 10 x 10 and use to solve division problems
- Multiply numbers and decimals by a multiple of 10, *e.g. 15 x 30, 1.4cm x 20*

DCF:

- Invite feedback/responses from others, e.g. use 'Comment' in Word Online/Excel Online for asking questions or adding suggestions
- Create groups and share work between them to allow review of work.

Thinking:

Plan - Activating prior skills, knowledge and understanding.
-Determining the process/ method and strategy.

ESDGC:

YCC:

Incidental Welsh

- *Mathemateg*
- *Un, dau, tri a gorfffen*
- *Pawb yn barod?*
- *Amser gorfffen*
- *Edrychwch*
- *Gwrandewch*

Comments:

Appendix 2

Name of Trainee: Laura Sparkes/ Demi Edwards

Session Ref:

Date:

Class: Year 5/6

Number of Learners: 24

Age: 9/10/11

Subject: Numeracy	
Learning Objective: To develop mental multiplication strategies and develop times table familiarity and recall	
Additional Learning Needs: N/A -	
Introduction: Explain lesson aims to learners: Improve mental multiplication strategies Develop time tables recall. Split the class in half, boys on one side girls on the other Explain the interactive maths multiplication game and that the boys and girls are going to race each other up the mountain	<u>Resources</u> A range of ICT including ipads, laptops and notebooks.
Main Task: Learners to log onto ipads/notebooks/laptops and select an application to use to practice multiplications and times tables. Choose between Times table Rock stars, J2ebblast, Topmarks and Number rock Learners to work as individuals through various levels of whichever application they have chosen. Upon completion of each round learners to record scores and scores to be submitted at the end of the lesson.	
Plenary: Learners to receive a number of rapid fire multiplication questions Hand to be placed up when answer known When a correct answer is given the learner must sit down.	
Links to Previous Learning: Links to previous lessons on multiplication strategies and timestables	
Independent Learning Opportunities: Learners provided with opportunity to independently develop mental multiplication strategies.	
Assessment for learning: Questioning	
Vocabulary: Multiplication, Mental strategies, times tables, recall	
Curriculum Coverage: – Transfer mathematical skills to a variety of contexts and everyday situations – Identify the appropriate steps and information needed to complete the task or reach a solution	

- Select appropriate mathematics and techniques to use
- Choose an appropriate mental or written strategy and know when it is appropriate to use a calculator
- Explain results and procedures clearly using mathematical language
- Recognise, and generalise in words, patterns that arise in numerical, spatial or practical situations
- Read and write numbers to 1 million and numbers to 3 decimal places
- Use mental strategies to recall multiplication tables up to 10 x 10 and use to solve division problems
- Multiply numbers and decimals by a multiple of 10, *e.g. 15 x 30, 1.4cm x 20*
- Identify multiples of numbers up to 10; use the terms multiple and factor
- Identify common multiples of two numbers

LNF:

Literacy:

Numeracy:

- Transfer mathematical skills to a variety of contexts and everyday situations
- Identify the appropriate steps and information needed to complete the task or reach a solution
- Select appropriate mathematics and techniques to use
- Choose an appropriate mental or written strategy and know when it is appropriate to use a calculator
- Explain results and procedures clearly using mathematical language
- Read and write numbers to 1 million and numbers to 3 decimal places
- Use mental strategies to recall multiplication tables up to 10 x 10 and use to solve division problems
- Multiply numbers and decimals by a multiple of 10, *e.g. 15 x 30, 1.4cm x 20*

DCF:

- Invite feedback/responses from others, *e.g. use 'Comment' in Word Online/Excel Online for asking questions or adding suggestions*
- Create groups and share work between them to allow review of work.

Thinking:

Plan - Activating prior skills, knowledge and understanding.
-Determining the process/ method and strategy.

ESDGC:

YCC:

Incidental Welsh

- *Mathemateg*
- *Un, dau, tri a gorfffen*
- *Pawb yn barod?*
- *Amser gorfffen*
- *Edrychwch*
- *Gwrandewch*

Comments:

Appendix 3



Dear Parent/Guardian,

Your child's school is a partner with Yr Athrofa at University of Wales Trinity Saint David in Carmarthen and Swansea. This school offers placements to students who are learning to be teachers.

The student-teacher in your child's class has been given the task of planning, teaching and evaluating one lesson so that he/she can develop specific strategies to improve their own teaching. As part of this, student-teachers will be observing the children's responses and asking some pupils their views on parts of the lesson. This is designed to inform students' own practice and support children's learning.

Any information collected would remain confidential, and both the school and the children would remain anonymous in work produced. The work undertaken would be in line with the University's ethical guidelines. If, at any time, your child does not want to share ideas, they would not be required to do so.

If you are happy for your child to contribute to the project, please complete the parental consent form below and return directly to the school as soon as possible. If you are interested in the outcome of this project or if you have any questions, please contact the University Partnership Office - partnership@uwtsd.ac.uk.

Yours faithfully,

Catherine Morgan
Module lead – The Enquiring Teacher

As Parent/Guardian of..... (pupil name), I do / do not give consent (please delete) for my child to take part in this project.

Signed.....(Parent/Guardian).

Date.....

Appendix 4

Initials _____

Are you happy to be watched in the lesson today?



Appendix 5

APPLICATION FOR ETHICAL APPROVAL

In order for research to result in benefit and minimise risk of harm, it must be conducted ethically. A researcher may not be covered by the University's insurance if ethical approval has not been obtained prior to commencement.

The University follows the OECD Frascati manual definition of research activity: "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications". As such this covers activities undertaken by members of staff, postgraduate research students, and both taught postgraduate and undergraduate students working on dissertations/projects.

The individual undertaking the research activity is known as the "principal researcher".

Ethical approval is not required for routine audits, performance reviews, quality assurance studies, testing within normal educational requirements, and literary or artistic criticism.

Please read the notes for guidance before completing ALL sections of the form.

This form must be completed and approved prior to undertaking any research activity. Please see Checklist for details of process for different categories of application.

SECTION A: About You (Principal Researcher)

Full Name:	Laura Sparkes		
Tick all boxes which apply:			
Member of staff:	☐	Student:	☒
Honorary research fellow:	☐		
Faculty/School/Centre:	Yr Athrofa		
Campus:	Townhill		
E-mail address:	1700361@student.UWTSD.ac.uk		
Contact Telephone Number:	07788208780		
For students:			
Student Number:	1700361	Undergraduate	☐
Programme of Study:	Primary PGCE	Taught Postgraduate	☒
Director of Studies/Supervisor:	Catherine Morgan	Research	☐

SECTION B: Approval for Research Activity

Has the research activity received approval in principle? (please check the Guidance Notes as to the appropriate approval process for different levels of research by different categories of individual)	YES	☒	NO	☐
			Date	
If Yes, please indicate source of approval (and date where known):	Research Degrees Committee	☐		
	Faculty Research Committee	☐		
	Other (write in) Module Team	☒		

Approval in principle must be obtained from the relevant source prior to seeking ethical approval.

SECTION C: External Ethical Guidance Materials

Please list the core ethical guidance documents that have been referred to during the completion of this form (including any discipline-specific codes of research ethics, and also any specific ethical guidance relating to the proposed methodology). Please tick to confirm that your research proposal adheres to these codes and guidelines.	
BERA (2011)	☒
University guidelines (2017)	☒
EWC code of practice (2017)	☒

SECTION D: External Collaborative Research Activity

Does the research activity involve collaborators outside of the University?	YES	☐	NO	☒
If Yes, please provide the name of the external organisation and name and contact details for the main contact person:				
Institution				
Contact person name				
Contact person e-mail address				

Where research activity is carried out in collaboration with an external organisation

Does this organisation have its own ethics approval system?	YES	☐	NO	☐
If Yes, please attach a copy of any final approval (or interim approval) from the organisation				

SECTION E: Details of Research Activity

Indicative title:	Does the use of ICT in a Key Stage Two classroom affect learner engagement?		
Proposed start date:	March 2018	Proposed end date:	April 2018
Purpose of research activity (including aims and objectives) Outline the purpose, aims and objectives of the research activity, including key research questions. Show briefly how existing research has informed the proposed activity and explain what the research activity will add and how it addresses an area of importance. (Maximum 300 words)			
<u>Purpose, Aims and Objectives</u> The purpose of the study is to investigate the effects of ICT use on learner engagement in the Key Stage Two classroom. To identify if the use of ICT in lessons raises learner's engagement and resulting attainment.			
<u>Key Research Questions</u> Does the use of ICT in a Key Stage Two classroom affect learner engagement? Does engagement correlate with the use of ICT? Do children using ICT to complete activities demonstrate a higher level of engagement than children who are not? Is there a correlation between the use of ICT, engagement and attainment?			
<u>Explanation</u> The existing research has touched on the importance of developing ICT skills in the primary school and the effects of ICT on attainment, however, the body of research on this area is lacking in breadth and many studies face applicability issues as they have been conducted in differing areas of the world (Jedskog & Nissen, 2004; Selwyn & Bullon, 2000; Tondeur, 2008 & Williams et al. 2011).			

Our research will add to the existing body of research by investigating the effects of ICT on pupil engagement in line with the Welsh curriculum. Additionally, it will offer an insight into the effects of ICT on pupil engagement and attainment. This is an area of importance as it will offer observations and recommendations for the Welsh curricular and draw links to the Successful futures document and the curricula reform as proposed by Professor Graham Donaldson. The study will also offer a body of knowledge which would be relevant to the incorporation of the digital competency framework in Key Stage Two classrooms across Wales.

(this box should expand as you type)

Proposed methods

Provide a brief summary of all the methods that may be used in the research activity, making it clear what specific techniques may be used. If methods other than those listed in this section are deemed appropriate later, additional ethical approval for those methods will be needed. (Maximum 600 words)

To conduct the research, I will be undergoing a Controlled Observation technique. I will have set the classroom up, decided what activity the children will be doing and know what behaviours I am observing before the observation is conducted.

Before starting the observation, I will follow an Overt method by making sure all children in the class are aware that they are being observed. A letter will also be sent out beforehand to be signed by a parent/guardian of the participant. Also, during the observation we will receive written and verbal assent from the participants.

I will be observing the children doing a maths task where I will be surveying the different behaviours shown throughout the lessons using ICT.

I will be systematically classifying the behaviours shown by recording them in a distinct category- these categories will be decided based on behaviours which demonstrate a lack of pupil engagement and recorded in a graph chart/behaviour schedule.

Question techniques will also be used for all pupils in the classroom. These questions aim to give a broader view of how children felt towards the lesson and whether ICT is a factor

in determining pupil engagement and attainment in a lesson.

(this box should expand as you type)

Location of research activity Identify all locations where research activity will take place.
A Large school located in a suburb of Swansea in addition to a small school located in the suburb of Swansea. (this box should expand as you type)
Research activity outside of the UK If research activity will take place overseas, you are responsible for ensuring that local ethical considerations are complied with and that the relevant permissions are sought. Specify any local guidelines (e.g. from local professional associations/learned societies/universities) that exist and whether these involve any ethical stipulations beyond those usual in the UK (provide details of any licenses or permissions required). Also specify whether there are any specific ethical issues raised by the local context in which the research activity is taking place, for example, particular cultural sensitivities or vulnerabilities of participants.
N/A (this box should expand as you type)

SECTION F: Scope of Research Activity

Will the research activity <u>include</u> :	YES	NO
Use of a questionnaire or similar research instrument?	☒	☐
Use of interviews?	☐	☒
Use of diaries?	☐	☒
Participant observation with their knowledge?	☒	☐
Participant observation without their knowledge?	☐	☒
Use of video or audio recording?	☐	☒
Access to personal or confidential information without the participants' specific consent?	☐	☒
Administration of any questions, test stimuli, presentation that may be experienced as physically, mentally or emotionally harmful / offensive?	☐	☒
Performance of any acts which may cause embarrassment or affect self-esteem?	☐	☒
Investigation of participants involved in illegal activities?	☐	☒
Use of procedures that involve deception?	☐	☒
Administration of any substance, agent or placebo?	☐	☒
Working with live vertebrate animals?	☐	☒
Other primary data collection methods, please explain in this box	☐	☒

If NO to every question, then the research activity is (ethically) low risk and **may** be exempt from **some** of the following sections (please refer to Guidance Notes).

If YES to any question, then no research activity should be undertaken until full ethical approval has been obtained.

SECTION G: Intended Participants

Who are the intended <u>participants</u> :	YES	NO
Students or staff at the University?	☒	☐
Adults (over the age of 18 and competent to give consent)?	☐	☒
Vulnerable adults?	☐	☒
Children under 18?	☒	☐
Prisoners?	☐	☒
Young offenders?	☐	☒
Those who could be considered to have a particularly dependent relationship with the investigator or a gatekeeper?	☐	☒
People engaged in illegal activities?	☐	☒
Others (please identify):	☐	☒

Participant numbers and source

Provide an estimate of the expected number of participants. How will you identify participants and how will they be recruited?

Pupils will be chosen based on ability level. Two children from the higher ability group, two children from the middle ability group and two children from the higher ability group from each class. A total of 12 children will participate. Participants will be chosen based on a professional discussion with the class teacher.

Information for participants:	YES	NO	N/A
Will you describe the main research procedures to participants in advance, so that they are informed about what to expect?	☒	☐	☐
Will you tell participants that their participation is voluntary?	☒	☐	☐
Will you obtain written consent for participation?	☒	☐	☐
Will you explain to participants that refusal to participate in the research will not affect their treatment or education (if relevant)?	☒	☐	☐
If the research is observational, will you ask participants for their consent to being observed?	☒	☐	☐
Will you tell participants that they may withdraw from the research at any time and for any reason?	☒	☐	☐
With questionnaires, will you give participants the option of omitting questions they do not want to answer?	☐	☐	☒
Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?	☒	☐	☐
Will you debrief participants at the end of their participation, in a way appropriate to the type of research undertaken?	☒	☐	☐
If NO to any of above questions, please give an explanation			
(this box should expand as you type)			

Information for participants:	YES	NO	N/A
Will participants be paid?	☐	☒	☐
Is specialist electrical or other equipment to be used with participants?	☐	☒	☐
Are there any financial or other interests to the investigator or University arising from this study?	☐	☒	☐
Will the research activity involve deliberately misleading participants in any way, or the partial or full concealment of the specific study aims?	☐	☒	☐
If YES to any question, please provide full details			
(this box should expand as you type)			

SECTION H: Anticipated Risks

Outline any anticipated risks that may adversely affect any of the participants, the researchers and/or the University, and the steps that will be taken to address them.	
If you have completed a full risk assessment (for example as required by a laboratory, or external research collaborator) you may append that to this form.	
Full risk assessment completed and appended?	
Yes	☐
No	☒
Risks to participants For example: emotional distress, financial disclosure, physical harm, transfer of personal data, sensitive organisational information	
The safeguarding processes of the university and individual school will read and abide by. Furthermore, the safeguarding and disclosure process of the school has been signed prior to the research. Additionally, no child will be treated differently as a result of choosing to participate/ not participate in the research. (this box should expand as you type)	
If research activity may include sensitive, embarrassing or upsetting topics (e.g. sexual activity, drug use) or issues likely to disclose information requiring further action (e.g. criminal activity), give details of the procedures to deal with these issues, including any support/advice (e.g. helpline numbers) to be offered to participants. Note that where applicable, consent procedures should make it clear that if something potentially or actually illegal is discovered in the course of a project, it may need to be disclosed to the proper authorities	
N/A (this box should expand as you type)	
Risks to investigator For example: personal safety, physical harm, emotional distress, risk of accusation of harm/impropriety, conflict of interest	
During the observation I will be accompanied by another student and will not be alone with the children at any point during the research. The research will take place in a classroom environment and will be overseen by a member staff. Treatment of pupils will remain consistent to avoid accusations of favourable treatment or inappropriate personal relationships. Pupils will be treated the same regardless of gender, ethnicity etc. (this box should expand as you type)	
University/institutional risks For example: adverse publicity, financial loss, data protection	
Behaviour and research will be conducted in a professional manner to ensure the reputation of the university and relationship between university and school is upheld. (this box should expand as you type)	
Adverse outcomes List measures put in place to limit any adverse effects or outcomes of research activity where appropriate. Include any emergency protocols.	
Standardisation of research methods including questionnaire and observation techniques.	

Research to be conducted in a professional manner.
 Children to be treated consistently and fairly to avoid adverse outcomes.
 All research to be kept anonymous to maintain confidentiality of school and participants.
 Health and safety and safeguarding policies of the school and university to be abided by.

Disclosure and Barring Service			
If the research activity involves children or vulnerable adults, a Disclosure and Barring Service (DBS) certificate must be obtained before any contact with such participants.	YES	NO	N/A
Has a DBS certificate been obtained?	☒	☐	☐

SECTION I: Feedback, Consent and Confidentiality

Feedback What feedback will be provided to participants, how will this be done and when? Completed assignment to be shared with school on request. (this box should expand as you type)
Informed consent Describe the arrangements to inform potential participants, before providing consent, of what is involved in participating. Describe the arrangements for participants to provide full consent before data collection begins. If gaining consent in this way is inappropriate, explain how consent will be obtained and recorded. Awaiting Decision
Confidentiality / Anonymity Set out how anonymity of participants and confidentiality will be ensured in any outputs. If anonymity is not being offered, explain why this is the case. No names to be included on any research materials as well as no information relating to the identity of participants.

SECTION J: Data Protection and Storage

In completing this section refer to the University's Research Data Management Policy and the extensive resources on the University's Research Data Management web pages (<http://uwtsd.ac.uk/library/research-data-management/>).

	YES	NO
Does the research activity involve personal data (as defined by the Data Protection Act)? <i>"personal data" means data which relate to a living individual who can be identified—</i> <i>(a) from those data, or</i> <i>(b) from those data and other information which is in the possession of, or is likely to come into the possession of, the data controller, and includes any expression of opinion about the individual and any indication of the intentions of the data controller or any other person in respect of the individual.</i>	☐	☒
If YES, provide a description of the data and explain why this data needs to be collected: (this box should expand as you type)		
Does it involve sensitive personal data (as defined by the Data Protection Act)? <i>"Sensitive personal data" means personal data consisting of information as to –</i> <i>(a) the racial or ethnic origin of the data subject,</i> <i>(b) his political opinions,</i> <i>(c) his religious beliefs or other beliefs of a similar nature,</i> <i>(d) whether he is a member of a trade union (within the meaning of the Trade Union and Labour Relations (Consolidation) Act 1992),</i> <i>(e) his physical or mental health or condition,</i> <i>(f) his sexual life,</i> <i>(g) the commission or alleged commission by him of any offence, or</i> <i>(h) any proceedings for any offence committed or alleged to have been committed by him, the disposal of such proceedings or the sentence of any court in such proceedings.</i>	☐	☒
If YES, provide a description of the data and explain why this data needs to be collected: (this box should expand as you type)		
Will the research activity involve storing personal data on one of the following:	YES	NO
Manual files (i.e. in paper form)?	☐	☒
University computers?	☐	☒
Private company computers?	☐	☒
Home or other personal computers?	☐	☒
Laptop computers/ CDs/ Portable disk-drives/ memory sticks?	☐	☒
"Cloud" storage or websites?	☐	☒
Other – specify:	☐	☒
For all stored data, explain the measures in place to ensure data confidentiality, including details of password protection, encryption and ~~anonymisation~~ : 		

Will the research activity involve any of the following <u>activities</u> :	YES	NO
Electronic transfer of data in any form?	☐	☒
Sharing of data with others at the University?	☒	☐
Sharing of data with other organisations?	☐	☒
Export of data outside the European Union or importing of data from outside the UK?	☐	☒
Use of personal addresses, postcodes, faxes, emails or telephone numbers?	☐	☒
Publication of data that might allow identification of individuals?	☐	☒
Use of data management system?	☐	☒
Data archiving?	☒	☐
If YES to any question, please provide full details, explaining how this will be conducted in accordance with the Data Protection Act (and/or any international equivalent):		
Data will be archived on completion of assignment on a password protected program.		
(this box should expand as you type)		

List all who will have access to the data generated by the research activity: Laura Sparkes and Demi Edwards (this box should expand as you type)
List who will have control of, and act as custodian(s) for, data generated by the research activity: Laura Sparkes (this box should expand as you type)
Give details of data storage arrangements, including where data will be stored, how long for, and in what form. Will data be archived – if so how and if not why not. Data will be archived on completion of assignment on a password protected program. (this box should expand as you type)

Appendix 6

Child 5, Lesson A, Interview Report Summary

Child 5 Mentioned how the lesson was enjoyable and liked the idea that they could use ICT during a Mathematics lessons. They declared how they did not enjoy mathematics normally but found the games fun and easy to use. Despite the games being fun, they did mention struggling at certain parts during the lesson due to not being confident with their multiplications. When questioned further they discussed how the speed at which they were required to answer the questions on the app was too fast for them and it made them feel left out from the rest of the class who they felt were on par with each other. For further lessons they said they would like to keep ICT but suggested that working as a team or modelling techniques might help them further their multiplication skills.

Child 1, Lesson A, Interview Report Summary

Child 1 enjoyed the problem-solving aspect of the app and mentioned how the games made Maths seem more enjoyable than normal. They had used this app previously, in other lessons, but mentioned how they felt it was never long enough. When questioned further about what the best aspect of the app was, they mentioned the design and the competition they could have with other members of the class; they liked to see their score increasing. Child 1 was confident with multiplications and had mentioned how they practice them at home. The app was a good way for Child 1 to further practice their multiplications in school. For future lessons they said they would like to keep using ICT and games but would like to try and be challenged further.

Child 3, Lesson A, Interview Report Summary

Child 3 liked using ICT in the lesson, as they didn't have much opportunity to use it at home but mentioned how they found the app quite frustrating. Despite being relatively confident with multiplications, they mentioned how the app was slightly too fast for them, with the easy level not being fast enough. When questioned further about using ICT they said they would have liked the option to use different devices and apps, as they felt this one did not compliment their skills. Despite this, they would like to use ICT in further Maths lessons as they did find the game interesting and thought the idea of playing games was fun. When asked about an element of the lesson they would like to change they suggested making the start of the lesson more interactive.

Child 2, Lesson B, Interview Report Summary

Child 2 found the variety of ICT to be the best thing about this lesson and enjoyed the freedom of being able to choose an application which suited their level of ability. They mentioned how trialling different apps kept them focused on the task for longer and added diversity into the lesson. When questioned on their use of ICT they said how they used technology a lot at home but didn't use any education apps, they only ever tried these in school. They mentioned how the games and being able to race other members of the class kept the lesson exciting but did mention how next time they would like to receive more of a challenge as although the apps were fun they were at times too easy.

Child 4, Lesson B, Interview Report Summary

Child 4 enjoyed using the different apps and found them beneficial for building their multiplication skills. They mentioned how their confidence with multiplication was not very high and how they liked using the apps as they could go at their own pace. They mentioned how enjoyable they found working with another learner on the apps as it gave them the opportunity to share information, validate ideas and problem solve. They discussed how using ICT in mathematics was fun and added excitement to the lesson but said for further learning they would like to continue to work collaboratively with another learner.

Child 6, Lesson B, Interview Report Summary

Child 6 expressed their dislike for multiplications in the beginning but mentioned how ICT made the lesson a lot more enjoyable. The variety of different apps kept them on track with what they needed to do, and they liked being able to try different learning techniques to see which one worked the best for them. Despite ICT being engaging in the beginning, they did mention how their concentration started to change towards the end of the lesson and blamed this on the levels certain games had as they felt these were too challenging. Towards the end of the lesson they mentioned how they did get more confident with their multiplications, but the timer sometimes put them off and made it hard for them to concentrate on what they were learning.
