Classroom CSI:
Developing a video-conferencing model for investigating
British Archaeology in schools

Elizabeth Warry

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UCL INSTITUTE OF ARCHAEOLOGY

Note: This Dissertation is an unrevised examination copy
for consultation only
ABSTRACT

This dissertation sets out to demonstrate that archaeology and video-conferencing technology, can address a need for schools to be able to access a museum’s expertise and collections without having to physically travel to it. It suggests that video-conferencing is a largely under-exploited technology in terms of pedagogy and content, as ascertained from a literature review and first-hand observation. Curricula in the UK are compared, including where archaeology falls within the syllabus. Educational theories are presented, specifically relating to challenge-based learning, a new teaching approach linked to the use of technology.

The second section focuses on the development of a new video-conferencing session at the Samsung Digital Discovery Centre in the British Museum. The research gathered in the first part is applied in practice; a project management plan is implemented. The session uses challenge-based learning, where the tasks are based on real-life situations. The Portable Antiquities Scheme and treasure finds were chosen, as it would require a range of skills and would engage the students’ interest. It demonstrates how archaeology can be used to support interdisciplinary teaching and be successfully applied in video-conferencing. It concludes with guidelines for developing video-conferencing sessions and that there is a need for video-conferencing, which it can be successfully implemented with the right pedagogy.
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### LIST OF ABBREVIATIONS

The following list presents abbreviations and acronyms used throughout the dissertation.

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<tr>
<td>Becta</td>
<td>British Educational Communications and Technology Agency</td>
</tr>
<tr>
<td>CCEA</td>
<td>Council for the Curriculum, Examinations and Assessment</td>
</tr>
<tr>
<td>CLEO</td>
<td>Cumbria and Lancashire Education Online</td>
</tr>
<tr>
<td>DCELLS</td>
<td>Department for Children, Education, Lifelong Learning and Skills</td>
</tr>
<tr>
<td>DCSF</td>
<td>Department of Children, Schools and Families</td>
</tr>
<tr>
<td>DENI</td>
<td>Department of Education Northern Ireland</td>
</tr>
<tr>
<td>DfE</td>
<td>Department of Education</td>
</tr>
<tr>
<td>DfEE</td>
<td>Department of Education and Employment</td>
</tr>
<tr>
<td>ICT</td>
<td>Information communication technology</td>
</tr>
<tr>
<td>JVCS</td>
<td>JANET Videoconferencing Service</td>
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<tr>
<td>KS</td>
<td>Key Stage</td>
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<tr>
<td>LTS</td>
<td>Learning and Teaching Scotland</td>
</tr>
<tr>
<td>MoL</td>
<td>Museum of London</td>
</tr>
<tr>
<td>NA</td>
<td>The National Archives</td>
</tr>
<tr>
<td>NSC</td>
<td>The National Space Centre</td>
</tr>
<tr>
<td>PAS</td>
<td>Portable Antiquities Scheme</td>
</tr>
<tr>
<td>PBL</td>
<td>Problem-based learning</td>
</tr>
<tr>
<td>QCA</td>
<td>Qualifications and Curriculum Authority</td>
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<td>SDDC</td>
<td>Samsung Digital Discovery Centre</td>
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<tr>
<td>VC</td>
<td>Video-conferencing</td>
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Thank you to the staff of the Museum of London, National Archives and National Space Centre for allowing me to observe their video-conferencing sessions.
Introduction

This study falls within the broad area of research of engaging the public in archaeology, in particular focusing on the application of technology to provide a means of interaction that is new and inventive. This relatively new, vast and multi-faceted subject is dynamic due to the speed of change and advances in technological development. This discussion focuses on the use of video-conferencing (abbreviated to VC in this study), which whilst it has been around for some twenty years has remained relatively under-used within museums and related organisations. In particular it considers whether there is a need for VC technology within museum school services, focussing on whether it can fill a gap for schools seeking to access museum collections and associated expertise, but unable to visit.

- How much demand is there for VC sessions by schools? If so, why?
- Can VC technology fulfil those needs?
- How can VC technology be successfully implemented?

The impetus for this research was prompted by the wish of the Samsung Digital Discovery Centre (SDDC) - a division of the British Museum education department - to develop a VC school session. The research therefore has a practical application, but also has parameters set by this aim. The session is going to be for Key Stage 2 to 3 students (ages 7-14) and will focus on the museum’s collections and work, in particular the Portable Antiquities Scheme (PAS), so there is a strong focus on archaeology. Another influence is the requirements and views of the SDDC and PAS staff to look into specific areas, such as a new teaching method – challenge-based learning. However this research is also inhibited by the timescale of the session development. This study will not contain a completed VC session and will be principally theoretical. To address the questions set above to remain within these parameters, the following objectives will be met:

- Provide an overview of the current state of the curricula in the United Kingdom for students aged 7 to 14 years old and where archaeology falls within teaching
- Carry out a literature review of VC
- Research educational theories and pedagogies, in particular looking at new teaching methods involving technology
- Visit other museums and observe VC sessions
- Develop an archaeology themed VC session based on the research findings
- Provide practical guidelines to developing and implementing a VC session
The text will be split into two sections, the first made up of research and the second describing the development of a VC session and guidelines. It is hoped that this dissertation will not only provide a theoretical overview of the application of VC within museums, but also initiate the application of research in practice, providing useful guidelines for others to follow. It should also add to the growing literature on archaeology and public engagement using technology.
SECTION ONE
CHAPTER ONE
Archaeology within the curriculum and its value

There is no national curriculum in the United Kingdom, rather there are four distinct curricula for England, Wales, Northern Ireland and Scotland. Within each of these regions, the curricula have been undergoing extensive changes are likely to continue into the foreseeable future. In England and Wales, the curriculum has a similar structure, being made up of Key Stages (KS), which are the levels of knowledge that students are expected to attain at specific ages. Although distinct, the curriculum in Northern Ireland also has KSs, whilst in Scotland, the progressive stages are labelled Primary 1-7 (example P1) and then Secondary 1-6. In England, Wales and Northern Ireland, Key Stage 2 covers ages 7 (8 in Northern Ireland) to 11 and Key Stage 3 is for ages 11 to 14; in Scotland these KSs roughly equate to Primary 4-6 and P7-S2 (Henson 2004a, 15).

In England, the national curriculum for KS1 and 2 has remained broadly the same since 1999, with KS3 being updated in 2005 (DCSF 2009). On 20 January 2011, it was announced that both the primary and secondary curricula would be reviewed, with changes being implemented by September 2013. The review has been instigated in response to a drop in international league tables and criticism that the curriculum has been reduced to a ‘tick-box’ system, which is oversubscribed, inflexible and does not permit teaching personalisation (DfE 2011a). In Wales the curriculum was revised in 2008, focusing more on the learner and the acquisition of skills (Welsh Government 2011), while the Northern Ireland curriculum also underwent a similar process in 2007, again with a focus on life skills and being part of society (DENI 2007). In Scotland, a new system, the Curriculum for Excellence, was introduced in 2011. This has proved highly controversial due to the low levels of guidance and the amount of freedom given to teachers – unlike the other regions of the UK, the curriculum in not set by law, but is under the control of Local Authorities and schools – there are no compulsory examinations at set points unlike the KS system, instead students are tested when deemed ready (BBC 2010a; BBC 2010b).

The core difference in the curricula between the four regions is the change from nationwide-implemented compulsory subjects in England and Wales, to Northern Ireland’s intermediate structure with schools being allowed to develop subjects tailored to their needs, contrasted with the almost complete freedom promoted in Scotland. In Scotland and Northern Ireland there are broad subject areas in comparison with the compartmentalised in-depth units required in England and Wales. The content of these different curricula is also diverse. However, without going into detail about the differences in the curricula within the UK, a general trend of ongoing change with a shift to teacher autonomy and interdisciplinary education can be seen. It is in this
context that archaeology’s application within the curriculum will be studied. Naturally, history will be the key subject of the study, but archaeology is integral to the study of the past and has a role within school education. However, given the underlying theme of this dissertation, Information Communication Technology (ICT) will also be discussed, alongside the inter-disciplinary nature of archaeology.

Archaeology and history in the curricula

Archaeology has never been taught as a separate subject in the curriculum, but it is cited as a resource for teaching history (Henson 2004b). A common theme is the need for students to use a range of sources, including documentary and non-documentary evidence (see figure 1). However, as in academia, where there is a division between the disciplines of history and archaeology, there are also differences in what each subject can offer. As stated above – archaeology is not separately taught subject – thus reflecting a long standing debate about archaeology being a ‘handmaiden’ to history, with an assumption that texts provide a more direct link to the human past than objects (Moreland 2006). This idea that archaeology is seen as supplementary to documentary evidence may also be a reason why teachers are disinclined to use archaeological material. However, it is the very fact that objects can be touched and handled, which makes it easier to connect with the human past. Documents are not so ‘hands-on’, the student has to decipher the text and check for biases in the account. Also, the process of excavation and the excitement of discovery are other stimuli to learning that archaeology can offer. Of course, archaeological interpretation is not free of bias, but in itself an artefact cannot lie about it size, texture or colour. Archaeological evidence, by its very nature, is useful for illustrating differences in interpretation, a skill that students are required to develop, and, unlike the approach to textual sources, artefacts allow students to draw their own conclusions and provide a good source of primary evidence. Another way in which archaeology can aid teaching is, for example, when trying to understand chronology, a student can place artefacts in a time sequence and witness how they change over time. The presentation methods used by archaeologists similarly provide examples of how the past can be illustrated in diagrams and drawings (Henson 1996 ¶ 6). In conclusion, it is advantageous to use evidence from both disciplines to support and provide as complete a picture of the past possible (Sauer 2004).

In terms of time periods, archaeological evidence is especially useful for eras that are less documented, such as, for example, the Saxon and Viking periods and prehistory. The periods studied vary according to the curriculum (see figure 2); Scotland for example, focuses heavily on its own past and local areas, an approach encouraged by their strong sense of nationalism and their tourism economy in contrast to England and Wales (Henson 2004b). Within the English and Welsh curricula, there is a focus on particular time periods and the accumulation of events, which
is said to lead to a fragmented view of the past, with students having a weak understanding of chronology (Harnett 2000). In Northern Ireland there is also an emphasis on local history, but also interestingly environmental issues around the preservation of historic sites – this is probably due to the interdisciplinary collaboration between the social sciences – geography in particular. It also connects to the trend towards curricula that are broad and inter-disciplinary, instead of topics being compartmentalised, which in the course of statutory examinations, leads to the marginalisation of some subjects (DfE 2011a).
<table>
<thead>
<tr>
<th>Subject Area</th>
<th>ENGLAND</th>
<th>WALES</th>
<th>NORTHERN IRELAND</th>
<th>SCOTLAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
<td>Key Stage 2</td>
<td>Key Stage 2</td>
<td>Key Stage 2</td>
<td>Key Stage 2</td>
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<td></td>
<td>&quot;how to find out about the past from a range of sources of information (for example, stories, eye-witness accounts, pictures and photographs, artefacts, historic building and visits to museums, galleries and sites, the use of ICT-based sources)&quot; (DEE and QCA 1999, 17)</td>
<td>&quot;use a range of sources, including ICT, e.g., artefacts, buildings and sites, adults talking about their own past, visual sources, data and appropriate written sources&quot; (DCELLS 2008, 13)</td>
<td>&quot;independently use a range of historical sources in their historical context, including documents, artefacts, visual sources, buildings and sites, music and oral accounts, statistical and numerical data, interpretations and representations, and a variety of ICT sources&quot; (DCELLS 2008, 15)</td>
<td>&quot;investigate the need to preserve history in the local and global environment, for example, visit an important historical site and evaluate the measures taken to preserve it; create the case for a local building or site to be preserved.&quot; (CCEA 2008, 1)</td>
</tr>
<tr>
<td></td>
<td>Key Stage 3</td>
<td>Key Stage 3</td>
<td>Key Stage 3</td>
<td>Key Stage 3</td>
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<tr>
<td></td>
<td>&quot;identify, select and use a range of historical sources, including textual, visual and oral sources, artefacts and the historic environment&quot; (QCA 2007, 114)</td>
<td>&quot;investigating the need to preserve history in the local and global environment, for example, visit an important historical site and evaluate the measures taken to preserve it; create the case for a local building or site to be preserved.&quot; (CCEA 2007, 31)</td>
<td>&quot;investigate the need to preserve history in the local and global environment, for example, visit an important historical site and evaluate the measures taken to preserve it; create the case for a local building or site to be preserved.&quot; (CCEA 2007, 31)</td>
<td>&quot;explore and evaluate different types of sources and evidence&quot; (LTS 2009, 1)</td>
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**Figure 1:** archaeology or related-words within the UK curricula in History or associated subject.
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<th>Subject Area</th>
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<th>WALES</th>
<th>NORTHERN IRELAND</th>
<th>SCOTLAND</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>History</td>
<td>History</td>
<td>The World Around Us</td>
<td>Environment and Society</td>
</tr>
<tr>
<td>Key Stage 2</td>
<td>Focus on political, economic, technological and scientific, social, religious, cultural or aesthetic perspectives</td>
<td>Focus on daily life</td>
<td>Focus on political, economic, social, religious and cultural history</td>
<td>Interdisciplinary: tied in with History, Geography and Science and Technology.</td>
</tr>
<tr>
<td>Key Stage 3</td>
<td>Local history: British history; Romans, Anglo-Saxons and Vikings; Tudors and the wider world</td>
<td>Emphasis on locality; Iron Age Celts or the Romans, Age of the Princes or in the Tudors or the Stuarts (DCELLS 2008)</td>
<td>The Normans: The changing relationship between Britain and Wales 1500-1760 and the wider world 1760-1914 Twentieth century individuals (DCELLS 2008)</td>
<td>Local area: Irish, British, European and global history (CCEA 2008)</td>
</tr>
<tr>
<td></td>
<td>Victorians or Britain since 1930: European case study</td>
<td>Changing relationships through time of the peoples of England, Ireland, Scotland and Wales: European and world history case studies Medieval, early modern, industrial and twentieth century periods (QCA 2007)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P1 – S4</td>
<td></td>
<td></td>
<td>Interdisciplinary: tied in with geography, literature and culture.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Emphasis on Scottish history from prehistoric to contemporary. British, European and world history.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(LTS 2009)</td>
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Archaeology is well suited to this model as it can be adopted across a range of subjects. For example, it ties in with geography through the study of changing landscapes and settlements and the availability of resources. Design and technology students can study past technologies and their development, whilst art pupils can take inspiration from pottery designs to jewellery. Archaeology can also provide data sets for mathematics and ICT can be used to correlate and present findings. Discussion about artefacts and debating their origins can improve communication skills, thus linking to English. In the case of science, archaeology employs a range of surveying techniques, conservation methods and material analysis. The advantage of archaeology is that it can provide real life scenarios, which students can apply in a whole range of studies. Despite these benefits, archaeology is not being studied in most schools. This may be due to the lack of teacher training or it being perceived as too academic for young children (Pearson 2001, x). A second issue is that the curriculum concentrates on narrative and named people from the past (Harnett 2000). Although not an obvious choice, one topic that has been neglected is that of ethics and social responsibility, other areas where the archaeological discipline can play a part (Henson 2004b), for example in the debates over the repatriation of artefacts or the dilemmas surrounding excavation in certain locations. Debate could be sparked over the return of the Elgin Marbles to Greece – calling on students to present the evidence and getting them to make their own decisions – this connects with citizenship and encourages independent thinking. This would link to current trends within the curriculum and demonstrate another way in which archaeology can be applied within education.

**ICT in the curricula**

The use of ICT within schools is a requirement within all curricula and is to be applied wherever possible in all subjects. In the case of history, for example, the Internet can be used for research, collating census databases, creating digitised maps and using computer programmes to present information (CCEA 2008; DCELLS 2008; DfEE and QCA 1999; LTS 2011a). There have been several government funding initiatives to improve technology within schools, such as the *Superhighways Initiative* and *Building Schools for the Future*. However most of these schemes have been subject to funding cuts or have been scrapped completely due to the recession (BBC 2010c). In addition, the *British Educational Communications and Technology Agency* (Becta), the government organisation dealing with learning and technology, closed down in 2011 (DfE 2011b). However it is evident that ‘digital technologies’ are a key component of contemporary education; government policy dictates that every school should have an interactive whiteboard, regardless of demand. It has been argued that the use of ‘digital technologies’ has become routine within schools and are “ideologically invisible” (Selwyn 2011, 20), with teachers, academics and government agencies being unquestioning in their application. Alongside technology being taken for granted, it has not been adapted to the school environment
itself, the equipment being designed for offices and therefore not ‘child-sized’. However despite these downsides, the assumed intrinsic value of digital technology is well-founded; on a macro level, it can be used for networking and accessing remote resources, whilst on a micro level, it allows for individualisation of meaning-making (Selwyn 2011).
CHAPTER TWO

Video-conferencing: development and benefits

Video-conferencing can be defined “as synchronous audio and video communication through computer or telephone networks between two or more geographically dispersed sites” (Lawson et al. 2010, 295). Compared to other communication technologies, such as telephone, fax, the Internet and email, the adoption of VC has been relatively slow even though, when compared to these other technological methods, it provides instantaneous interaction. It has been suggested that the slow uptake may be attributed to the initial costs of setting up the technology, but as the equipment becomes cheaper, more robust, with faster Internet connections and becomes more commonly used in everyday life (for example the introduction of video calling on mobile phones) it will become better established. It has been largely used for long-distance learning courses (Lawson et al. 2010). By the end of 2009, just under 40,000 UK schools were registered for the JANET Videoconferencing Service (JVC(S)) (JANET 2011a). Currently there is fair volume of literature available on creating a successful educational videoconference, however much of this was published in the 1990s and early 2000s when VC had a peak in popularity. This was most likely down to the government push for the introduction of ICT in the classroom; the use of technology within schools has been described as a having ‘pendulum’ effect, with its development and application often being transitory (Abbot et al. 2005).

There are two main VC service providers supplying connectivity and lists of sessions for schools wanting to connect to museums: JVCS and Global Leap. However, there are also regional providers (such as Cumbria and Lancashire Education Online (CLEO)). It is possible to connect through direct contact and by using alternative video link services. Global Leap was the original not-for-profit organisation that led the way for VC partnerships with museums and which partnered with the DfES in carrying out research into the use of technology within schools (discussed below). However its funding was cut and it therefore introduced a small annual subscription for schools to pay which has impacted on its popularity. Global Leap provides a more complete service compared to JVCS, which is part of the government funded JANET, the UK’s education and research network. Global is primarily led by Mike Griffith, a keen advocate of VC, who manages bookings but also checks and tests connections before the session. JVCS does not do any preparation and does not provide as much technical support. Therefore, after discussion with some museums that provided VC, there was a consensus that Global Leap was the preferred service (N. Hayden pers. comm. 21 June 2011). For a list of content providers for KS2 to 3, see appendix 1 and see chapter 4 for VC case studies.
**Videoconferencing in the Classroom Project**

The use of VC for educational purposes was highlighted in a UK government initiative started in September 2001 by the DfES called *Videoconferencing in the Classroom Project*. This sought to encourage its application within schools. It involved hundreds of schools across England which had incorporated VC at varying levels in a range of classroom activities and thereby encompassed the whole age range. High specification equipment was loaned to schools for the project. Global Leap was used to organise and connect VC sessions as well as providing teachers with support materials, for example, *Videoconferencing in the Classroom: Communications Technology across the Curriculum* (Arnold *et al.* 2002). The Universities of Leicester and Cambridge, both with funding from Becta, were commissioned to evaluate the initiative (Lawson and Comber 2010). The survey was carried out over a school year and included a diverse range of schools, covering different economic backgrounds, both rural and urban. Twenty-eight schools were studied in-depth and each had different levels of competence with the technology, from entry level to established users. Four subject areas were identified where VC was most used: history, geography, English and foreign languages. It was also noted that VC provided a good opportunity to offer cross-curricula links (Comber *et al.* 2004a).

It found that there were four models for VC use:

- **Familiarisation**: the first stage of using VC, involving basic training in the technology. Simple exchange often with another school, but with weak curricular links.
- **Substitution**: replaces the traditional curriculum delivery, for example, when a subject is not offered at a school or when expertise is lacking.
- **Enhancement**: the most common model. VC is an integral part of a traditional approach, where it can add value to the learning experience. Examples include: access to a remote expert, i.e. a museum or a foreign school for practising language skills.
- **Adaptation**: where teachers explore possible uses of VC beyond traditional pedagogies and where there is a ‘novel’ method to learning that is unique to the technology (Comber *et al.* 2004b, 23-25).

In most cases, VC was used for a special “one-off” event; one of the most common modes of interaction being ‘one-to-many’ with a remote expert. Contextual factors, such as structure, organisation, links to the curriculum and technical issues affected the patterns of use. Teachers found sessions were highly motivating for students and that their behaviour improved during the video-conference. They also noted that the presence of a ‘real’ audience meant that students took
their participation seriously and appreciated the ‘authentic’ experience of talking to an expert. For example, in a VC session with the Cabinet War Rooms, a student commented “…showed us things we haven’t got in school and we could talk about them... you can communicate with people you would probably never meet.”(Comber et. al. 2004b, 35). Although teachers were unable to provide statistical evidence for improved performance, they were all agreed that it had a positive impact on students’ work. Other advantages of VC recorded included:

- Flexible
- Cost effective
- Useful for remote communities
- Access to experts i.e. museums
- Fewer health and safety concerns
- Another learning platform to create diversity in teaching
- Offer a world beyond the school walls
  (Boyd et al. 2008; Comber et al. 2004a; Lawson et al. 2010)

**Learning benefits**

There is not much statistical evidence of the learning benefits of VC (Lawson et al. 2010) as it is hard to measure or quantify the learning for any educational activity, especially informal situations. There is often too much reliance on examinations which has been criticised (as will be discussed in chapter three) (Jarvis et al. 2003). The Museum of London carried out a small study into the learning benefits of VC from some sessions they held in 2008, using the *Generic Learning Outcomes* (a framework designed for measuring learning in informal educational activities). This research found evidence of improved ‘knowledge and understanding’, changes in ‘attitude and values’ and ‘enjoyment, inspiration and creativity’ categories in follow up work (Boyd et al. 2008). From literature and the *Videoconferencing in the Classroom Project*, several learning benefits were noted:

- Increased student motivation. Using the ‘novelty’ of technology to engage with a topic.
- Improved speaking and listening skills.
- Increase in confidence and self-esteem, especially in open discussions.
- Exposure to technology, useful skills for later work life.
- Exchanges with foreign counterparts improved language learning.
- Impact on cultural awareness; connecting with different countries.
  (Comber et al. 2004a; Gage et al. 2002; Lawson et al. 2010)
VC and its innate structure has also been linked to constructivist, learner-centred approaches and reflexive practices; often in the sessions, the teacher reduces their level of involvement, thereby giving the student greater autonomy - the pupils’ questions and actions lead the direction of the activity. It is also a social activity, which relates to constructivist theories (Gage et al. 2002).

Issues

VC does have its disadvantages but most of these can be overcome through preparation and good quality equipment. The key problem is technical malfunction, for example, loss of connection and image and sound quality. However this is why a test call should be carried out one to two weeks before the actual session in order to identify any technical problems. An alternative solution would be to have technical staff present or on call, but not all schools have access to such resources. In terms of equipment, ISDN was the most common form of connectivity with only a small number of schools having a dedicated VC room. The top three brands of equipment were: Polycom, Picture Tel and Tandberg. The quality of school equipment can be variable, a factor not within control of the session provider, but a minimum technical specification can be stated (Comber et al. 2004a). Some of the other issues highlighted were:

• Background noise. The location of microphones and cameras, especially in large groups. Difficulty in being heard. Time delay in the audio and video can also add to confusion.
• The amount of preparation, such as setting up the session and doing test calls. Also briefing the children on behaviour.
• VC sessions are noisy events, leading to some children being able to ‘hide’ from the facilitator.
• Not all students enjoy VC; there is an element of self-consciousness due to the students being on camera. The non-physical presence can be a somewhat surreal experience, leading to users feeling isolated. Conversely, some students can be distracted by their own image. Research, however, has shown that this is forgotten when they become involved in the activity.
  (Boyd et al. 2008; Comber et al. 2004a; Knipe and Lee 2002; Lawson and Comber 2010; Lawson et al. 2010)

VC, however, cannot match the experience of a physical visit to a museum, although it may still emulate the excitement of such a special event; it is, however, a good substitute for schools who are unable to visit or who are in remote locations (Boyd et al. 2008). It is this benefit, which highlights the important role that VC can play in expanding a museum’s outreach.
What makes a successful video-conference?

The success of a video-conference is usually highly dependent on the enthusiasm of one particular teacher in a school it is the individual efforts of one member of staff which has led the way in VC so far. From studies a number of key parameters have been identified that should ensure the success of a video-conference and its effectiveness:

- The identification of appropriate partners with pre-conference planning; including an agreed focus and associated resources.
- A clear educational objective with strong links to the curriculum; the session needs to fit logically within the syllabus or topic sequence.
- Preparing the students about what to expect; discussing behaviour and agreeing ‘rules of engagement’.
- The length of the VC session; 20 to 60 minutes depending on the age of the group. 40 to 45 minutes in the most common duration.
- Technical problems; pre-conference calls, familiarity with the equipment and a back-up plan if the connection is lost.
- The room in which the video-conference is taking place needs to be free of external noise; the layout of the room will also affect the session, as well as the number of students. It is important that the students are located near the screen displaying the video, and that they can hear and be heard.

(Lawson and Comber 2005; Boyd et al. 2008)

Videoconferencing, technology and pedagogy

It is useful to make a distinction between a successful video-conference, where in terms of the technological resources everything goes to plan, to an effective session, where learning objectives are met (Lawson and Comber 2010). VC lacks its own pedagogy and studies have shown that there is no shift in teaching methods when using the technology (Comber et. al. 2004a). VC is yet to be embedded within school strategy and planning, neither has it become “internalised within educational practice” (Abbot et al. 2005, 226). To develop further, VC has to provide something that is not offered by conventional teaching and there has to be a viable reason for its implementation, rather than simply using it because it is available (Gage et al. 2002). However, this lack of pedagogy is a trend that can be detected with other technologies in the classroom.
Technology has added a new dimension to educational theory and it has been argued that pedagogies have not managed to keep up with the rate of change. As Noss and Pacher (1999) stated:

“...viewing new technologies as merely an opportunity for faster or easier access to information will severely restrict the opportunities for positive educational change, and many even bring about change in the wrong direction.” (Noss and Pachler 1999, 195)

Unfortunately this statement still holds true in most cases within school education. Pedagogies have been slow to develop and this has led to technology not being successfully utilised. Government initiatives have made the application of technology within schools compulsory and have also made the assumption that all students have access to computers at home, an unfounded over-generalisation (Noss and Pachler 1999; Selwyn 2011). However, it is true to say that children of this generation are becoming 'used' to technology which has become part of their everyday lives, given the popularity of social media and computer games (Kiili 2005). Within education, there has been a slow uptake on how technology and games can be used as an aid to teaching, partly due to teachers not being able to make the connection between digital leisure pursuits and how they can be adapted for educational purposes (Royle and Colfer 2010). The leap from using technology for just simply 'speeding up' communication to being seen as an actual pedagogy has begun, as seen in the Scottish curriculum where ICT and game-based learning are encouraged as methods of teaching. Learning and Teaching Scotland argues that technology has become embedded in our culture and that children must be equipped with relevant skills for their future lives (LTSb 2011). However, with the closure of Becta and the lack of a clear directive by the current government, there is a degree of uncertainty about the future of technology in education (Finnegan 2011). The development of digital-based pedagogies may have to come from the private sector and informal educational organisations (Royle 2009).
CHAPTER THREE
Pedagogy and Learning theories

When considering the development of a new school session, it is important to consider the structure of the activity, particularly in respect of the educational theory. All activities will have an underlying pedagogy and an assumption of how knowledge is acquired. It is therefore important to address this issue, rather than evading it. In recent years, in England in particular, the school curriculum’s educational structure has been heavily criticised for being too compartmentalised (Paton 2011). This will be discussed further in comparison to museum education and recently developed new educational theories, such as challenge-based learning. To delve into this subject, one must look at the contentious debates within psychology and sociology, which have had several shifts in paradigm over the years.

In the 1950s, behaviourism and the Pavlovian view have dominated. These approaches to learning are based on stimulus-response; this positivist approach proposes that knowledge is acquired through scientific study and exists externally to the mind of the passive recipient. It is heavily based on the concept that we learn step-by-step, by subject, building upon small pieces of discrete information of increasing complexity – a linear based approach. In the 1970s, there was a shift in psychology from ‘realism’ to ‘idealism’, proposing that knowledge is derived internally and becomes fact through believing it to be true. This means that learning derives from an individual’s personal experience and is developed through an active process of practical experience (Hein 1998). This paradigm links the work of Jean Piaget on cognitive constructivism which is based on the idea that when an individual encounters an obstacle to be overcome, they either assimilate or accommodate the learned experience a process termed ‘perturbations’. Information that conflicts or contradicts current knowledge causes ‘disequilibrium’ which in turn leads to new constructions. The idea is that “knowledge is acquired as a result of the individual’s attempt to maintain intellectual equilibrium” (Davis 2005, 22). Learning is considered circular (Davis 2005).

Based on this model, the acquisition of knowledge is dependent on an individual’s past experiences and consequently each person has a different view of reality which in turn affects how they perceive new information. A fact can have meaning to one person, but may have a different impact on another. Based on these two schools of thought, there are different pedagogies which are best represented in a diagram (figure 3):
‘Didactic’ is subject-based and sequential, building from simple to complex; normally with only one interpretation, known as the sole truth. ‘Stimulus-response’ is similar; however it presents multiple interpretations with the emphasis on method. There is no objective truth. ‘Discovery’ expresses the importance of active learning and ‘hands-on’ experience, new discoveries leading to shifts in knowledge. The desired conclusions, however, may not be attained. ‘Constructivism’ is based on the methodology that the learner must be engaged in both mind and body by carrying out experiments to deepen knowledge; personal conclusions do not need to fit objective truth (Hein 1998). From these foundation pedagogies, several branches have been developed, for example, problem-based learning (PBL) and experiential learning, both of which have roots in constructivism. The schools session that is being developed will fall into this category and form the focus of this dissertation.

PBL was developed in the 1960s, first being pioneered in medical schools. It has mainly been used in adult education. It works on the concept that students need more than just knowledge to cope with and contribute to society, but need to be adaptive and develop skills in problem-solving. PBL activities involve students working in groups on a realistic problem where they have to use their prior knowledge, identify the knowledge they need to acquire and where the required
information can be obtained to solve the problem. The instructor steers understanding through providing guiding questions and resources, but it is ultimately left to the students to undertake their own research. An example of PBL based activity would be a group of seven students, where one which is elected as a scribe to record discussion on a flipchart. There would be initial session and then a follow up, whilst the tutor acts as a mediator for any problems in group dynamics (Engel 1991). The overriding goals of PBL are to develop: flexible knowledge, problem-solving skills, self-directed learning skills, collaborative skills, and intrinsic motivation. Learning is ‘active’ and involves the social construction of knowledge (Hmelo-Silver 2004). Experiential learning is similar in structure, where the emphasis is on the individual learning process. Certain qualities are needed in order to be successful; the learner must be actively involved, be able to reflect upon the experience and apply problem-solving skills. The focus is on ‘doing’ rather than reading information from a book, employing observation and interaction. Knowledge is gained through both personal and environmental experiences (Kolb 1984). Both constructivist, experiential and related approaches share the idea of reflective thinking which is defined as:

“...the process of creating and clarifying the meaning of experience (past or present) in terms of self (self in relation to self and self in relation to the world).” (Boyd and Fales 1983, 101)

The main criticism of constructivist-based teaching methods (and associated schemes, such as inquiry-based learning), given the lack of guidance and facts, are the demands on the working memory. Also termed as cognitive load, it has been suggested that when the learner’s memory is busy solving a problem and handling many items at one time, information is easily lost and does not become retained in long-term memory. It has been argued that the presentation of incomplete information, or the lack of it, leads to an inaccurate representation of known fact, which is in stark contrast and counter-intuitive to most academic disciplines where in-depth research is the norm (Kirschner et al. 2006).

Archaeology notably lends itself to hands-on learning experience given the tangible quality of artefacts; this advantageous aspect is highlighted by constructivist theories. Howard Gardner’s theory of Multiple Intelligences is based on the idea that there are various modalities of intelligences which respond to different sensory stimuli. Eight intelligences are identified: spatial, linguistic, logical-mathematical, bodily-kinesthetic, musical, interpersonal, intrapersonal and naturalistic. For example, an individual with bodily-kinesthetic intelligence, uses their body to solve problems and will therefore respond best to ‘hands-on’ activities (Gardner 1985; Smith 2008). Two of these intelligences – linguistic and logical/mathematical – are normally focused
upon in school education. It has been suggested that a blend of multiple teaching methods is probably the best way to proceed (Witfelt 2000).

**Challenge-based Learning**

Apple Inc. developed challenge-based learning in 2008 in response to an American education crisis. Their study found that students considered that what they learnt at school was irrelevant to their lives and that an emphasis on tests led to poor results. It is linked to PBL in method in that it applies real-life problems, rather than theoretical situations. The problems used also related to issues in modern society, such as the sustainability of resources, cultural identity, war and apathy. It stressed the importance of multiple solutions. The application of technology is vital element in this method; embracing Web 2.0 as a communication tool. Also, unlike PBL, it has been applied in school education, rather than higher education. It does, however, have similarities to PBL in that it applies the idea of self-directed learning, students working in groups, working through problems amongst themselves with the teacher acting as facilitator.

In a pilot study, using six secondary schools across the US, it was found that 97% of the 321 students involved, found the experience worthwhile and that 80% of students reported that they had made a difference to their schools or communities. Only 3.4% did not enjoy the experience, but the reason behind this was due to problems within the teacher-student relationship. Students found working on a challenge-based project stimulating, engaging and relevant. As well as citing having gained new skills and knowledge, teamwork, critical thinking, technology, communication and presentation skills, students also reported that they had gained confidence and personal fulfillment. The main hurdles were group dynamic, the self-directed element, research and preparation; the teachers also cited that they had found it difficult to provide direction without giving away the answers. However, 100% of teachers stated that the students had exceeded their expectations both in the quality and quantity of work (Johnson et al. 2009).

“…Challenge Based Learning engages learners, provides them with valuable skills, spans the divide between formal and informal learning, and embraces a student’s digital life.” (Apple Inc. 2008, 2)

The structure of challenge-based learning is best shown in diagram (figure 4), the different elements being explained in a table (figure 5):
Figure 4: an overview of challenge-based learning (Johnson et al. 2009, 8).

**CHALLENGE-BASED LEARNING**

**The Big Idea:** The big idea is a broad concept that can be explored in multiple ways, is engaging, and has importance to high school students and the larger society. Examples of big ideas are Identity, Sustainability, Creativity, Violence, Peace, and Power.

**Essential Question:** By design, the big idea allows for the generation of a wide variety of essential questions that should reflect the interests of the students and the needs of their community. Essential questions identify what is important to know about the big idea and refine and contextualize that idea.

**The Challenge:** From each essential question a challenge is articulated that asks students to create a specific answer or solution that can result in concrete, meaningful action.

**Guiding Questions:** Generated by the students, these questions represent the knowledge students need to discover to successfully meet the challenge.

**Guiding Activities:** These lessons, simulations, games, and other types of activities help students answer the guiding questions and set the foundation for them to develop innovative, insightful, and realistic solutions.

**Guiding Resources:** This focused set of resources can include podcasts, websites, videos, databases, experts, and so on that support the activities and assist students with developing a solution.

**Solutions:** Each challenge is stated broadly enough to allow for a variety of solutions. Each solution should be thoughtful, concrete, actionable, clearly
articulated, and presented in a publishable multimedia format such as an enhanced podcast or short video.

**Assessment:** The solution can be assessed for its connection to the challenge, accuracy of the content, clarity of communication, applicability for implementation, and efficacy of the idea, among other things. In addition to the solution, the process that the individuals as well as teams went through in getting to a solution can also be assessed, capturing the development of key 21st century skills.

**Publishing:** The challenge process allows for multiple opportunities to document the experience and publish to a larger audience. Students are encouraged to publish their results online, soliciting feedback. The idea is to broaden the learning community and foster discussion about solutions to the challenges important to students.

**Figure 5:** a table setting out and explaining the different elements of challenge-based learning (Apple Inc. 2008, 2-3).

A practical example of challenge-based learning would be the sustainability of water. The challenge would be to demonstrate how they could improve either their home, school or community use of water. Guiding questions would be researching the local use of water, how much is used and how much wasted. The guiding activities could include calculating their water footprint or a study of where and how water gets used and recording it on a spreadsheet. Guiding resources could involve looking at government statistics and other related databases from other organisations. Students would then need to come to a solution based on what they have discovered; there can be multiple answers, but the solution must be concrete and actionable. An example might be to check the school for water leakages and the landscaping (working out how much water is needed and how much can be saved); findings and solutions then have to be presented to the school board and brochures created (Apple Inc. 2008, 8-10).

There have been some recent developments linked to digital game-based learning which is similar to the concept of challenge-based learning. It works on the idea of immediate feedback with clear goals and challenges which should be matched to the learner’s skill level; it is based on flow theory, leading to a positive user experience. It creates an environment where the learner can become totally absorbed in the activity- through game playing, the learner gains a sense of control. This approach moves away from drill-based and practice games, which can lead to the learner applying trial and error, and not focusing on outcomes, until the score improves (Kiili 2005).
Theories in practice: the curricula and school sessions

Until recently, changes in the curricula in the UK have been heavily based on didactic and stimulus-response methods where students are required to know a hierarchical list of subjects by certain stages. Their knowledge is also tested through regular examinations. This is beginning to change, for example in Scotland. However these developments are still at a very early stage with many teachers uncertain of how to apply the new curriculum (BBC 2010). In practice the curricula have remained text-book based, with the emphasis on the teacher passing knowledge to students as though they were empty vessels to be filled; it can be compared to a 'shopping list' with tick box items (Smith 2000). Also there has been an emphasis on Mathematics, Science and English which has skewed the curriculum, with teachers concentrating on these subjects to the detriment of others - as one teacher described the English curriculum “.... they [pupils] are not learning, they are being coached to do particular tests which have no benefit to them at all” (Eason 2009 ¶ 27). It is a difficult situation, as there has to be a balance between the positivist approach, whilst presenting students with a variety of teaching methods and thus meeting the needs of their different learning styles. This raises problems with implementing pedagogies, especially when formal education is concerned. One of the benefits of museums, which, whilst still trying to support the content of the curriculum, have the freedom to develop school sessions without the restriction of following compulsory guidelines set down by government; this places the emphasis on museums as places of 'edutainment' (Roberts 1997).

School trips and learning sessions are a means of providing the diversity needed in education, offering experiences on which to build knowledge (Cooper 2000, 11). It is recorded that:

“We remember: 20% of what we read, 30% of what we hear, 40% of what we see, 50% of what we say, 60% of what we do, 90% of what we see, hear, say and do” (Smith, L. 2000, 5).

Whereas classroom teaching is abstracted from real-life, trips and activities provide an opportunity to apply knowledge that has been learnt. Special one-off workshops can offer kinaesthetic and active environments, free from textbooks and 'sitting still'. They can appeal to a range of learning styles and can be enjoyable for children of a range of levels, whatever their background or past knowledge, ethnicity or gender, including students with special needs. This approach can also provide an opportunity for non-academically bright children to shine. Pupils can practice their social and communication skills without the formal pressure of being tested (Hooper-Greenhill 1997; Hooper-Greenhill 1999).
Now that educational theories have been explored, it raises the question of how they can be applied in practice in this project. The Frome Hoard school session will incorporate several elements that have been discussed in the earlier chapters. By using VC, the ICT element sought in government policy is brought in and, as required in the curricula - exposes children to technology. It is also part of the general strategy of bringing technology into the classroom. VC also broadens the museum’s outreach, reaching schools that are outside London or even abroad, or for pupils are unable to make the trip. Even though VC does not involve the students leaving the classroom, it still creates an element of excitement, a special event, different from the routine of the school day. It has been shown that technology can be a motivator. Challenge-based learning is a relatively new method and is not currently pursued in most educational systems; it can therefore provide diversity in teaching and offers a fresh approach. This style of teaching is appealing to children of this generation as it can be related to the concept of gaming, something to which most students will have had exposure and a good insight. Even though it does not use artefacts, it is still hands-on, social and engaging by working through a series of decisions based on the resources available, without the intervention of adults, but through a facilitator. This approach is closely linked to constructivist theories, allowing students to reflect on their choices and to build up their own knowledge. The activity can also be related to different types of learners, whether logically or bodily. In terms of connecting to archaeology, the discipline lends itself to multiple interpretations. The use of a real-life case study – the Frome Hoard - will hopefully demonstrate that the decisions that people make can affect the preservation of archaeology. This also links to the curriculum in terms of teaching social responsibility and citizenship; moreover, the Roman period ties in given the historic period to which the hoard relates.

**How to present the past to children**

This is a particular aspect which needs to be considered in depth as it is a major factor in the teaching of history and links in with political issues. History can sometimes be presented in a simplistic and reductive way which can effectively amount to a deception, the simplistic interpretations of the past, provoking long held resentments and grudges within society; some argue that history can be dangerous and should not therefore be taught to children (Molyneux 2011). The simplification and selective approach to people and events leading to a distorted view of the past. Within the curricula, there is a trend towards developing understanding rather than learning facts, which can lead to confusion as children do not understand why events happened (Lee 1994). It can be said that for children of certain ages, their perception of time is not fully developed and too much detail can therefore be daunting and boring; it is thought that the
transition in understanding occurs around the age of 9 to 10 years of age and is developed by the age of 12. It is evident that children connect best with narratives and stories that have been simplified and which use people’s names. It has been suggested that characters and events can be fictional, so long as the story stays true to the time it portrays (Nawrot 1996). History and known events are set and conclusions drawn, a situation which is linear, passive and relatively constraining for children. The most interesting storylines can be modified, as in games, which respond to the actions of the player. History and archaeology, by their very nature can present multiple and conflicting narratives, and it is this aspect that may be beneficial to concentrate upon when teaching children. Within these subjects, the interpretations of evidence, or the stories created, are sometimes unfinished or are wrong – this allows for reflection (Davis 2005). Also it is fair to say that if an individual is interested in a particular subject, they will seek to find out more, something which many academics and teachers underestimate in both children and the public. In conclusion, it is not wrong to simplify the past in order to make it more understandable and interesting, but the facts and events should remain accurate. In this respect, it is better to present multiple interpretations and allow children to decide on their own interpretation, thus making history more ‘interactive’.
CHAPTER FOUR

Video-conferencing case studies

The following three case studies are presented in order to provide an insight into current practices in museums and educational organisations. Sessions were observed on site at each organisation’s location. For each case study, an overview of the organisation’s VC facilities will be given, followed by a summary of the session observed and its supporting resources. Three case studies were chosen; this number seemed appropriate taking into account the scope of this study, but was also determined by the response level from organisations approached with the request to observe sessions. The Group for Education in Museums mailing list and individual suggestions decided which three case studies should be used. The National Space Centre was actively sought given this particular organisation’s sessions’ structure which has strong similarities to the session being developed for this project (given links to challenge-based learning); this case study may therefore be more detailed.

The data collected is qualitative, using informal interviews with members of staff and observing of sessions. Consequently, there is awareness of the inherent biases in the data due to the nature of the selection and the author’s particular bias and interest. The presence of an observer may have had a bearing on the behaviour/interaction of those involved, although the students were not aware of the presence of an additional viewer (Blaxter et al. 2010). The sessions observed were determined by availability, although certain activities were proposed at initial contact due to their content relating to historic themes or time periods. Moreover, there was no choice in the schools involved in the sessions, so the students’ abilities varied; however pupils were either KS2 or 3. The quality of sessions were not within the control of the author – this being dependent on the facilitator and the behaviour of the pupils.
CASE STUDY: Museum of London, London

Date: 21/06/2011

Background:
The Museum of London (MoL) offers various VC sessions from KS1 to KS4 to A level activities. Subjects range from the Romans to the World War II (see appendix 1 for a list of sessions for KS2/3). The MoL has held sessions with schools in a number of locations, including military forces communities abroad and international schools, for example in Germany, Poland and Cyprus. VC has been part of their educational remit for 7 years and was introduced because they wanted to increase the diversity and breadth of what they could offer. The main change they have made to their sessions is to make them less one-way and more interactive (N. Hayden, pers. comm., 21 June 2011).

Session:

Roman London Alive – 45 minutes – KS 2 – Free

This VC session involves the students meeting a character from Roman Londinium in which an actor describes daily life, asks students questions, inviting them to do the same and discusses Roman artefacts. In this session, the costumed character is Alpius, a retired soldier, who is living in a Roman villa.

There is a supporting 13-page booklet available online, outlining the session, the characters and providing pre- and post-session work suggestions, such as looking at a map or a timeline of the Roman empire and preparing questions. Follow up work involves writing a letter to the character or comparing Roman food to contemporary dishes. The booklet also outlines curriculum links: history, the Romans and the development of historical enquiry skills (MoL 2009).

Set Up:

A test call is made a week before. The sessions are run from a small multi-purpose room. The background is a large printed image of the interior of a Roman living room, which is a reconstruction of one on display in the museum. On camera, it looks realistic and has depth. They also sometimes use a green screen, but they have found that the image is more effective. Two people are always in attendance at the sessions: one an actor and the other a technician. He/she
makes the connection, controls the sound effects, information slides and camera movement. See figure 6 for a diagram on the layout.

**Equipment:**

Television, camera and laptop: Polycom VC equipment.

![Diagram](image)

**Figure 6:** the layout of the VC equipment (the grey-coloured areas represent tables). The laptop is packed away at the end of the session, while the ‘stage’ is left in position.

**Description of session observed:**

When the connection is made, ‘Roman-style’ music is played and the costumed actor is sitting in position. The music then fades out and Alpius greets the students. The school in this particular session was located near Manchester and the 25 students, aged from 10 to 11 years old (KS2), were seated on the floor in rows - not all were in camera view. Alpius taught the students how to say ‘hello’ in Latin and then proceeded to discuss Roman politics, military, daily life, festivals and his own personal story. He tests their knowledge and understanding through questions. Slides are used to display maps and objects, which overlay the live video feed. The actor also continuously asks the students what their own lives are like, making comparisons. Alpius then goes on to say
that he is leaving to go to the bathhouse soon and shows them an object for cleaning the skin. He describes the structure of the bathhouse. Then there is 5 minutes for questions. At the end, he gets ‘called’ away by a maid to leave and music is played as the call is terminated. The scripted section (although there is no set order or content) lasts around 40 minutes with 5 minutes at the end for questions.

Conclusions:

• The videoconference went smoothly, both technologically and in terms of content. The session is well rehearsed.
• Didactic in structure; not much interactivity and quite linear.
• The whole set-up for VC seems well established.
CASE STUDY: The National Archives, London

Date: 22/06/2011

Background:

The National Archives (NA) has an extensive range of VC sessions for KS2-5, ranging from Mediaeval to World War II (see appendix 1 for a list of sessions for KS2/3). The NA started VC nine years ago with the aim of reaching a wider audience and most are adapted on site sessions. They considered that an hour is long enough and provides time for discussion. The content varies, but either involves a costumed actor talking about daily life or an employee of the NA discussing documentary evidence on a particular subject. The NA also offers a ‘Virtual Classroom’, where students log in onto a website and then can work with documents. These can be annotated and analysed, and the students can ask questions via a chatbox or microphone (T. Calderwood, pers. comm., 22 June 2011)

Session:

What is History? – 60 minutes – KS 3-4 – Free

This VC session involves students meeting an education officer employed by the NA. The session aims to develop the students’ skills in interpreting different types of documents and developing their understanding of biases and making inferences. This is achieved through a series of questions, where the students have to identify the document’s age, who made it and why. The documents studied relate to the curriculum (NA has a different ‘What is History?’ for Welsh schools and for different KSs. Resources used include documents from Henry VII’s reign, Victorian criminal registers and photos of Suffragettes.

There is a 5-page booklet available online called ‘What is history? An introduction to working with original documents’ (NA 2004). Rather than being specifically related to the video-conference, it provides a general overview of how different types of sources can be used to study the past. It states that there is no set activity to be completed beforehand; it does, however, provide a short exercise where students look at different types of documents. The curriculum links are to history and the development of historical enquiry skills.
**Set Up:**

A test call is done roughly two weeks before a session. The sessions are run from a dedicated VC room. The background is a folding display board with a print-out of NA logo pinned to it; they also use a green screen for historic reconstructions. Only one person is present for the session. See figure 7 for a diagram of the layout.

**Equipment:**

Television, camera and desktop computer: Polycom VC equipment.

![Figure 7: the layout of the VC equipment (the grey-coloured area represents a desk).](image)
Description of session observed:

There was a problem with the sound quality at the start when the first connection was made, but this resolved by disconnecting and re-calling. The session involved 25 students aged 11-12 years old (KS3) from a school near Liverpool. They were sat in rows with desks and chairs, and it was difficult to see and hear students sitting towards the back given the low to medium sound and image quality. The NA education officer began by introducing herself and where the NA are located; she then went on to pose questions to them about what the NA does – waiting for their answers and giving clues until they got it right. The facilitator asked the teacher to choose students to respond - this was not always successful as students tended to reply at the same time, making it difficult to hear. The facilitator then discussed the aims of the session, which were to test the students’ analytical skills and what they could deduce from documents. The first item shown – using slides - was a document from Henry VII’s reign which the facilitator invited students to examine for clues about who was depicted; a similar approach was taken for the next document, a Victorian child’s criminal record, but she also asked the question “do you think the sentence was too harsh?” – thus encouraging the students to come up with their own views. The session builds up to focus on the Suffragettes, starting with the image of a woman having her photograph forcibly taken; the facilitator highlights how students can start developing their own understanding and insights by considering the evidence before them i.e. who is the victim? The same photograph appears in a newspaper article but with the police warden (who had been holding the woman still) blanked out; the facilitator asks why this should be, suggesting that the evidence can be altered depending on its source. At the end of the session, the students are given 5 minutes to ask questions.

Conclusions:

• In terms of content, the video-conference went well, however, in technical terms, the quality was average; this is being due to the quality of the school’s equipment rather than the NA.
• The facilitator was confident and remained calm during the connection problem. The pace of the session was good as was the range of materials used, which ensured the students’ attention.
• The structure of the session was interactive, with the facilitator prompting the students with questions, encouraging them to make their own conclusions, rather than giving them the answers straight away.
CASE STUDY: The National Space Centre, Leicester

Date: 18/07/2011

Background:

The National Space Centre (NSC) is part of a network of 50 Challenger Learner Centres across the world. It had its origins in an initiative of the Wheeling Jesuit University in West Virginia in the USA in response to the Challenger Space Shuttle tragedy in 1986. The NSC, as well as providing e-mission video-conferences, offers on-site Simulated Space Missions which were bought by the NSC and then modified to fit the UK curriculum. VC at the NSC began seven to eight years ago to improve outreach to schools unable to visit the Centre. The NSC has modified aspects of the original sessions by re-writing the script to make it British English rather than American English. For this session, Operation Montserrat, they included more video clips and formatted the script by adding hyperlinks – thus making it easier to navigate. Another team (see below about teams) joined in so that larger groups could be accommodated (up to 32 students) (C. Darby, pers. comm., 18 July 2011).

Session:

E-Mission Operation Montserrat – 90 minutes – KS 2-5 - £300 + VAT (subsidies for East Midlands Schools)

An e-Mission is a simulated challenge delivered using video conferencing and data streams. This mission is based on a real-life event, when the island of Montserrat is about to be hit by hurricane at the same time as a volcano is threatening to erupt. The students take on the role of an emergency response team, monitoring the situation and helping to evacuate residents away from the danger zones. The script is modified in accordance with the KS.

There is a wealth of on-line resources for this session, including a webpage entitled a ‘teachers’ toolkit’, which provides an overview of the mission, preparation work, what to expect during the videoconference and finally, follow up work. It is also possible for the teachers to have free training (3 hours) in order to gain the knowledge and skills required to carry out the session. The training also seeks to develop confidence in using ICT at school and to make links between different subject areas in the curriculum. Curriculum links include: mathematics, geography, citizenship and English (NSC 2011).
Set up:

A test call is made about a week before the actual session. The sessions are run from a dedicated VC room. A range of equipment is used, including four computer screens – one displaying the live feed, another the session script, a third with the ‘chatbox’ (the live feed where the facilitator provides information and the students can discuss findings) and finally, a screen with the power point slides. There is also a television and a DVD player for displaying videos and a document projector. The background is a fixed display board with a map of Montserrat pinned to it. There is only one person present for the whole session. See figure 8 for a diagram of the set up.

Equipment:

Four computer screens, television, document project, camera: Aethra VC equipment.

![Diagram of VC equipment]

Figure 8: the layout of the VC equipment (the grey-coloured area represents a desk).

Description of session observed:

After making the connection, the facilitator checks that all participating teams are present, recording any absentee teams (in this particular case, there was no media team or research team). The class was Year 8 or Year 9 students (KS 3) - the actual numbers involved was
unknown due to the angle of the camera (an estimated group size of 25). The facilitator then gave each team an initial question and asked the students to log on to a website (a different one for each team), containing the information needed to carry out their individual tasks. There are several teams:

- Communications Team (2-3 students)
- Hurricane Team (3-5 students)
- Volcano Team (3-5 students)
- Evacuation Team (3-5 students)
- Satellite Team (3-7 students)
- Media Team (Optional) (3-5 students)
- Research Team (Optional) (1-3 students)

An example question for the Satellite Team would be to check that the satellites are working and if they were providing any information about the condition of the island. An example resource for the Evacuation Team would be a data sheet displaying the population of each town. Throughout the whole session, the questions have a similar format, allowing the students to become familiar with the tasks. For example, the Evacuation Team always deals with the questions ‘what kind of transport?’, ‘from where?’ and ‘what route?’. Another example of a task is to create a radio report for the people of the island, which the students then have to ‘broadcast’ live. Throughout the whole session five minutes is the equivalent of an hour on the island. An important element of the session is the role played by the Communications Team, which has a Communication Officer and a Data Officer – these two students are responsible for relaying the other teams’ progress and findings to ‘mission control’ so that the facilitator does not have to keep an eye on each team. Indeed, the facilitator does not read the chatbox feed, rather it is the medium to provide information to the pupils (the facilitator copies and pastes data from the script). The facilitator calls up each team to the front to discuss their decisions and then informs them of the outcome of their choices. In the case of the Evacuation Team, they failed to notice that Mission Control had advised that sea conditions made it unsafe to travel, but they chose to use boats to evacuate a town, resulting in 200 deaths. There are several modes of delivery such as the chatbox, accompanied by PowerPoint, video (an example being images of a street flooding) and verbal communication. The facilitator uses a remote control to switch between medias. He also uses a laminated worksheet to keep track of the students’ decisions, such as where and how many evacuation buses they have deployed. The facilitator follows a script that highlights the key events scheduled to take place at allotted times (such as at the 60 minutes mark) almost like ‘stage directions’, increasing and decreasing tension - the scenario builds up momentum with problems
such as rioting in one town and culminating in the eruption of the volcano. The facilitator ends the session by telling the students what actually happened, explaining how well they did and inviting them to describe their experience of the session. There is also time for some questions.

The key elements of this session are the well-structured script supported by a range of material, together with different methods of communication, e.g. chatbox and radio broadcast. Students also learn that their actions result in outcomes and accordingly develop teamwork skills. The session is fast paced and maintains momentum, which keeps the students fully involved and react as though the events are actually happening.

Conclusions:

• The conference went well technically and the session content was strong.
• Has links to challenge-based learning with constructivist elements; the scenario was realistic and therefore engaging.
• Rather than telling the students what to do, the facilitator simply made sure that the session maintained its pace and momentum, at the same time making suggestions about what should be done – prompting students in the right direction.
SECTION TWO
CHAPTER FIVE

The development of a new video-conferencing session

Having undertaken a literature review of the UK curricula, VC trends and educational theories, and having observed VC sessions at first hand, the dissertation now moves onto the next stage – applying the research in practice. In this chapter the development of a new video-conferencing at the SDDC in the British Museum will be described and discussed in the following order:

- Introduction to the project and its beginnings
- Planning and project management
- Development of the structure and content

SAMSUNG DIGITAL DISCOVERY CENTRE

The SDDC is a division of the Learning, Volunteers and Audiences Department (LVA) at the British Museum. It opened in March 2009 and uses digital technology to interpret the British Museum’s collections. The centre works with families, schools and young people - all activities are free (British Museum 2011a). The SDDC is sponsored by Samsung Electronics and has a range of equipment, including laptops, Android mobile phones, tablets, cameras and video cameras. The SDDC has a dedicated room containing an interactive whiteboard, flat screen televisions and a green screen. Example school programmes include: Sutton Hoo Headline where children research the discovery and excavation of artefacts and visit the gallery. Acting like reporters they then create, rehearse and film a news report, using the green screen to choose different backdrops for the interviews. Passport to the Afterlife is a family activity in which visitors use Android phones to collect clues on an augmented reality trail in the Egyptian galleries; once they have found the missing words from the spells in the Book of Dead, they go back to the centre and create a ‘passport to the afterlife’ (pictures and spells) using ‘Create a Comic’ software.

Origins of the new VC session

The SDDC is always looking for new ways in which to utilise the equipment and a meeting was held on 17 January 2011 to discuss the development of a new schools session. Two suggestions were made: a gaming style session involving the students using a mobile phone application and searching the galleries for objects (working in competing teams to earn points) or a video-conferencing session. The video-conferencing session was examined as there had been requests made to the British Museum to provide opportunities for schools located too far away to visit, to

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participate in activities. The two proposals were put forward to the Head of Schools Education and it was decided to pursue the VC session.

PROJECT MANAGEMENT

Before discussing the new session and its development, the next section will set out a project plan to demonstrate that the new session meets the goals and criteria required by the LVA department and the British Museum (the layout and content of the project plan is taken from Polastre 2010 with further guidance provided by Field and Keller 1998 and PRINCE2 2011). A well thought out project plan with key stages set out, is essential to the overall success of a project, ensuring that milestones are achieved and deadlines are not missed.

PROJECT PLAN for a new video-conferencing session

Introduction

The Samsung Digital Discovery Centre (SDDC) is a division of the Learning, Volunteers and Audiences (LVA) department at the British Museum. It specialises in creating activities that use digital technology to interpret the museum’s collections with equipment sponsored by Samsung Electronics. It continually looks to expand its services, to reach new audiences and to diversify its activities; in this respect the development of a new video-conferencing schools session is seen as going in the right direction to for fulfil this aim.

Policy and Context

This project is part of the wider organisational structure and approach taken by the British Museum as stated in The British Museum: Strategy to 2012 (2008) and falls under its policy on enhanced access to the collections, as well as its use of digital technology:

“Digital media will be central to increasing engagement with the Museum's collections... This will require at least one and maybe multiple partnerships with world-class media or technology companies.” (British Museum 2008, 12).

Goals

Using video-conferencing technology, the goals are:

• To broaden the outreach of the museum.
• To offer activities to schools unable to come to the museum
• To diversify the SDDC school services.
Objectives

Over the 12-24 months the objectives are:

• To develop a new schools session that uses video-conferencing technology in an inventive and original way – focusing on the unique aspects that are not provided by physical visits.
• To develop a session based on the British Museum collections, in particular the work of the Portable Antiquities Scheme (PAS).
• To pilot the new session in September/October 2011 with schools being able to make bookings from November 2011.

Key Stakeholders

• The British Museum
  o Places its reputation and image to the public on a world wide level.
  o Fits into its long-term strategy.
• The LVA Department
  o Enhances its reputation within the education, school and museum networks.
  o Uses its budget and resources to fund the project.
  o Creates a new service that will be cost effective and a benefit to the department.
• The Portable Antiquities Scheme
  o Increases public awareness of its programme.
  o Enhances its reputation within the archaeology, museum and school networks.
  o The session uses its resources and expertise.
• The schools located within the UK or worldwide that use the session
  o Will evaluate the quality of the session and its learning benefits.
  o Will make the session a worthwhile venture.
• Samsung Electronics
  o Will enhance their reputation and image as the sponsor of the SDDC.
  o Their equipment will be fully exploited, demonstrating its use and potential.
  o Will fulfil sponsorship requirements.

List of deliverables:

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Recipients</th>
<th>Delivery Date</th>
<th>Delivery Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video-conferencing school session</td>
<td>The British Museum (LVA dept); schools</td>
<td>November 2011</td>
<td>Completed session</td>
</tr>
</tbody>
</table>
### Materials for the session

<table>
<thead>
<tr>
<th>Materials for the session</th>
<th>The users of the session (children)</th>
<th>November 2011; on going</th>
<th>Used during session, various media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher resources for the session</td>
<td>The users of the session (teachers)</td>
<td>November 2011; on going</td>
<td>Used before and after the session, web links</td>
</tr>
<tr>
<td>VC equipment</td>
<td>The British Museum (LVA dept); schools</td>
<td>November 2011; on going</td>
<td>Used during the session</td>
</tr>
</tbody>
</table>

**Figure 8:** list of deliverables.

### Milestones

See appendix 2 for Gantt chart.

### Assumptions, Constraints and Dependencies

The main assumption is that the project will probably take a little time to gain momentum given the time constraints imposed by other work, such as the development of other projects in the LVA department and resources being directed elsewhere. This will impact upon the amount of time that team members have to spend on the project. The student working on the project will also be constrained by her degree assignments. However, given the deadline for testing the prototype, piloting and submission of the dissertation, tasks will need to be completed by a set date (22/09/2011). Other constraints include the costs of equipment and the availability of funding within the LVA budget or the need to find other sources of funding. Another constraint is the restriction on the sole use of Samsung products, but if an essential piece of equipment is not available, it may be sourced from other manufacturers. A core dependency is the need for all those involved in the project to meet regularly as the development of the session requires the experience of the SDDC and LVA staff in creating new sessions and working with children. The workload would be too great for one individual. Other potential problems, together with preventative measures and possible solutions are highlighted by a Risk Table (appendix 3).

### Quality and Standards

Project standards:

- The project plan will be discussed and reviewed regularly at meetings, alterations being made to the timescale where applicable – progress against deadlines will be checked in order to ensure that they are being met.
- Updates on project progress will be provided at meetings with relevant stakeholders being
informed of current state of play afterwards.
• Goals and objectives will be examined and refreshed as necessary.
• Activities, tasks and risks will be monitored and expanded as necessary.

VC session standards and quality:

• Quality must match British Museum standards and those set by the Samsung Electronics sponsorship, i.e. using the museum’s collections and Samsung equipment where possible.
• Standards must match other British Museum education activities (benchmarked).
• Must be of a good standard in order to ensure that teachers that expectations are met i.e. links to curricula.
• End product (materials created for the session) will be reviewed by members of the team, other LVA staff and PAS staff (checking content and facts).
• Once prototyped and piloted, evaluation will commence -this will highlight any problems that need to be addressed.

Roles and Responsibilities

The number of people involved in the project is small, their individual roles being determined by their specific expertise, rather than being given specified roles (figure 9). It is likely that there will be a degree of external expertise from the digital technology industry who may provide advice voluntarily or for a fee.

<table>
<thead>
<tr>
<th>Individual</th>
<th>Description</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>One member of staff from the SDDC</td>
<td>Works with children, families and schools using digital technology</td>
<td>To help develop the session structure, materials and technological aspects.</td>
</tr>
<tr>
<td>One member of staff from LVA</td>
<td>Works with children, families and schools using hands-on activities</td>
<td>To help develop the session structure and materials.</td>
</tr>
<tr>
<td>Technical staff</td>
<td>Maintains equipment within the SDDC and the British Museum</td>
<td>Will decide which equipment to purchase.</td>
</tr>
<tr>
<td>PAS staff</td>
<td>Knowledge of PAS treasure finds</td>
<td>Can help choose case studies and provide data/resources for the session.</td>
</tr>
<tr>
<td>Staff from the department of Prehistory and Europe</td>
<td>In depth knowledge and expertise</td>
<td>Can provide detailed information about the artefacts used in the</td>
</tr>
</tbody>
</table>
Staff from conservation  | Conserve most treasure finds. Have in depth knowledge and expertise. | Can provide detailed information about conservation of the artefacts discussed in the session. Supply resources.
--- | --- | ---
Masters student  | Studying a Masters in Public Archaeology | To help develop the session structure and materials. Also Project Manager.
Intern  | Gaining experience at the British Museum | To help develop the session structure and materials

**Figure 9:** table presenting the individuals involved in the project and their roles.

**Communications**

Given the small size of the team working on this project, the communication methods are:

- Meetings
- E-mail
- Telephone

**Budget**

The work hours put into the project by British Museum staff are part of their regular workload. The intern and student input are voluntary. The majority of costs are attributed to the purchase of equipment and possible external expertise. Funding will most likely come from the LVA budget or from other external sources. Resources for office supplies and printing needed in creating the materials for the session, will fall under the LVA budget.

Estimated budget: £8000.00

Estimated cost of equipment: £4402.00 (appendix 4 for equipment breakdown)
DEVELOPMENT

Phase I: Initial brainstorming session

During the initial meeting to discuss the development of a new session at the SDDC, the VC suggestion was also brainstormed. As one colleague had recently visited the NSC and observed the Mission to Montserrat session, it was decided to base the structure of the new session using the same format. Challenge-based learning therefore became the founding concept of the session structure (as discussed in chapter 3). To summarise, it uses real life case studies and requires students to make a series of decisions based on the evidence they are given; students are encouraged to work in teams and produce materials such as booklets to present their conclusions.

Due to the nature of the PAS and their work, it was decided to base the session on treasure finds. This also meant there would be a partnership between two departments in the museum - this brings the dual benefits of sharing of resources and knowledge, whilst raising awareness of both the SDDC and PAS.

The Portable Antiquities Scheme and Treasure Finds

As well as recording small finds that are voluntarily submitted to the scheme, PAS also deals with treasure finds, which fall under the Treasure Act or the older law of Treasure Trove (see appendix 5 for definitions).

The different stages that possible treasure finds have to go through is set out below (varies according to the circumstances of discovery and find type):

• The finder has 14 days to report the find to the coroner or local Finds Liaison Officer.
• The British Museum PAS department is informed about the find.
• Excavation is then carried out if required.
• PAS writes a report detailing the find with photographs.
• Coroner rules whether it is treasure at the inquest.
• The find is valued by the Treasure Valuation Committee - museums wishing to purchase the find then have 4 months to raise the funds.

(J. Parol and I. Richardson, pers. comm., 3 August 2011)

The Frome Hoard was selected because of the actions of the finder, the importance of the find and the weight of resources that PAS can provide. The Staffordshire Hoard was also suggested due to the degree of its popularity. It was decided, however, that on account of the fact that the hoard is now owned by Birmingham City Council and Stoke-on-Trent City Council, it was best to
go with a Treasure Find that the British Museum had acquired or were at least conserving. The Frome Hoard, at the time of writing, was being processed by the British Museum, although full conservation was not being carried out, given the cost. Following the decision to use the Hoard, the head of the Museum of Somerset, [who have acquired it,] was contacted, requesting permission to use the Frome Hoard in the session. This was granted and possible partnership will be developed sharing the resources created for the session, with the Museum of Somerset.

**Phase II: session structure and curricula links**

After the initial meeting, the ‘Frome Hoard’ VC session was further developed using the concept of challenge-based learning and PAS. The preliminary structure and key aspects were agreed and these were further developed (more detail of the final session is provided in chapter 6):

- The session will be 90-120 minutes in duration.
- For 30 KS2 to KS3 children
- During the session the students will be split into five teams:
  - Archaeology Team
  - PAS/Treasure Team
  - Conservation Team
  - Museum Team
  - Media and Communications Team
- The session will have three parts, with each team having to address one question for the phase:
  - The initial discovery
  - Implications of treasure declaration
  - Conservation, further research and display

The following curriculum links were also made:

- History, Roman Britain and local history
- ICT
- English
- Mathematics
- Citizenship
- Interdisciplinary

Additional key skills are: teamwork, research, evaluation, making decisions and understanding consequences (S. Mannion, *pers. comm.*, 28 January 2011).
Phase II: Changes to the structure and content of the session

During this phase, the team also met with Alyson Fielding, the Story Consultant of the *Malcolm Tucker’s Missing Phone* iPhone app. Fielding had experience in creating storylines that include simultaneous events and how best to develop and present them. She talked to us about the concept of a historical matrix and how the user can be led to the same conclusion, whilst feeling they have control over the direction they are taking, i.e. by only allowing certain information to become available at set times. She discussed the importance of using peaks and troughs in the story in order to stimulate excitement and to maintain the users’ attention. It was also suggested that fake stories could also be created in order to promote more excitement or to fill any gaps in the actual story (A. Fielding, *pers. comm.*, 28 June 2011). Her useful advice was adopted in further development of the session and influenced how it was finally structured.

During the course of the journey back from observing the NSC video-conferencing session, there was an in-depth discussion on the content of it. The decision was taken that rather than making up fictional events, it would be better to use several real-life case studies – choosing various finds with different discovery stories, periods and materials. This would mean that there would be more teacher resources for post-session activities, with resources on each case study, therefore providing more options and curriculum links to different time periods. Also, after examining the set up, equipment and gaining advice from the NSC VC visit, the purchase of equipment was discussed; it was decided to join JVCS and Global Leap as these are the booking services used by most schools, but to still offer alternative connections if suggested by schools.

Phase III: Researching potential case studies

Once it had been decided that several cases studies would be used in the session and the basic structure had been laid out, the next stage was to research potential Treasure Finds that could be used. It was decided that the finds connected to the British Museum would be chosen, which had preferably been acquired or where the museum had a large involvement in their conservation. During this phase of development, several meetings were held with PAS staff to discuss possible examples and the resources that could be used. Following suggestions from members of the PAS Treasure Team and from colleagues also working on the project, eight potential cases were studied in more detail. The eight treasure finds included:

- The Frome Hoard
- Burnham on Crouch Hoard
- Hackney Hoard
- Ringlemere
• Staffordshire Hoard
• The Chiseldon Cauldrons
• Vale of York Hoard
• Uttlesford Bronze Age axe heads

These case studies were chosen for their diversity, for example Uttlesford where the case involving nighthawking and Burnham on Crouch because it offered a large amount of resources (J. Parol and I. Richardson, pers. comm., 3 August 2011). During a meeting where all eight case studies were presented and discussed, the list was narrowed down to four (three will eventually be chosen for the session, but it was decided to further develop four in case extra materials were needed). The four selected were:

• The Frome Hoard: a Roman find having links to the curriculum for most regions of the UK, also lots of information. A good example of a metal detectorist reporting the find.
• Hackney Hoard: relatively modern hoard with a human element (story of how the hoard was buried). Also falls under the Treasure Trove law rather than the Treasure Act.
• Ringlemere: large multiple-period site including Bronze Age and Anglo-Saxon. Can also look at how ‘associated finds’ works under the Treasure Act.
• Chiseldon Cauldrons: Iron Age find. Chosen for not being a coin hoard. Lots of conservation involved with this find, including residues in the cauldrons and interpretations about why it was buried.

Due to the change in content of the session it was decided to change the ‘Frome Hoard VC session’ to ‘Treasure Challenge’; to encompass the multiple PAS treasure finds and series of challenges it would involve. Now that the basic structure and content of the session had been settled on, the next phase of development could begin – creating timelines, tasks and media – which is discussed in the next chapter.
CHAPTER SIX

The ‘Treasure Challenge’ session and an example aspect

In this chapter the structure and resources developed for the session will be discussed (as at time of writing). The requirements that need to be fulfilled by the school will be listed, together with the session outcomes. The fundamental elements of the session will then be presented, with a full description of one aspect setting out examples of activities and media.

REQUIREMENTS

• Booking (through JVCS, Global Leap or by other means) and VC equipment.
• A computer room or similar, with enough computers for each team (minimum of five). The session requires an Internet connection in order to access the website for the activities and resources.
• Teachers are provided with pre-session resources, eg what to expect, the curriculum links, what to discuss with the students beforehand, ie a brief outline of PAS and conduct and behaviour during the session.

OUTCOMES

• The session’s emphasis is interdisciplinary, supporting teaching in several subjects and providing a means for students to combine multiple disciplines.
• The key subject areas are: ICT (VC technology but also manipulating data on computers and using the Internet), History (covering Roman, Bronze Age, Iron Age, Anglo-Saxon and World War II periods) English, Citizenship, Science, Geography and Mathematics. Due to the session being based on PAS finds there is a strong link to local history.
• The session places emphasis on the building of life skills, such as teamwork, analysis and communication.
• It is hoped that by completing this session, students will gain an insight and understanding into how decisions and actions have an effect on the preservation of the past.
• An opportunity to learn about the discipline of archaeology and the public programme run by PAS.
FUNDAMENTAL ELEMENTS

Phases

It was decided after researching PAS and consideration of the different stages in which treasure finds are handled to simplify the activity into three phases:

- **Discovery**
  - Students will be given initial information about the find, the circumstances of its discovery and where it was found.

- **Excavation**
  - During this stage, different excavation techniques will be discussed, including the different skills of people needed for excavation, conservation and security issues.

- **Post-excavation**
  - This phase is about research, conservation and display.

- **Inquest**
  - During this phase of the session, the facilitator will review and summarise the different stages and declare the find as treasure or not according to the Treasure Act.

Teams

The students are divided up into five teams with 5-6 in each team:

- **Archaeology Team**
  - Concentrates on excavation aspects, such as what tools to use, and mapping the site locations.

- **Treasure Team**
  - Researches into the Treasure Act, such as what constitutes treasure and also has charge over the organisation of the excavations, ie. security and hospitality. Writes a PAS report for the coroner proposing that the find is treasure.

- **Conservation Team**
  - Looks into conservation techniques during and after excavation. Also transport issues.

- **Museum Team**
  - Researches finds. Looks into the display, such as writing labels for the display cases and creating educational brochures.

- **Media Team**
  - Deals with the press aspects. Draws up interview questions and writes a press release. One example activity will include a response to an inaccurate report.
Students will have similar tasks for each treasure find and for each phase, so they will become familiar with the pattern of the session. There has been discussion about adding a Communications Team in order to accommodate an additional two students if needed. This team would collect and correlate the answers from the other teams and be the first point of contact for the facilitator (as in the NSC VC session in chapter four). During the session, the facilitator acts as a ‘PAS Coordinator’ located in HQ at the British Museum - the background behind them will be a Victorian-style office with bookshelves and a hat stand.

**Moodle and script**

For the session it was decided that the best format for sharing tasks and resources was to use a website. Moodle was chosen, an Open Source Course Management System (CMS); it is often used by universities to share teaching resources for courses as it also provides for participants to communicate with teachers and fellow students through a forum. It is free to download, so schools can easily download the programme prior to the session. Moodle is a platform on which multiple medias can be shared, such as word files, PDFs, audio, video and web links; it also allows for other features, such as a ‘chatbox’ and the submission of work (Moodle 2011). See appendix 6 for annotated mock-up of the website that will be used by the students. During the session, the facilitator will follow a written script with key events and timings, using a laminated printed table (so that it can be wiped clean) to keep track of the students’ answers.

**AN ASPECT OF THE TREASURE CHALLENGE SESSION: THE FROME HOARD**

The first case study to be developed was the Frome Hoard as most of the people working on the project knew this find best (there were also more resources readily available). The Frome Hoard was discovered in April 2010 in a field by Dave Crisp using a metal detector. The 52,503 Roman bronze and silver coins (dating from AD 253 to 305) were contained within a large pottery vessel (45 cm in diameter) and were processed by PAS at the British Museum. [The hoard has now been acquired by the Museum of Somerset (Moorhead et al. 2010)]. The first stage in the development of the session was to create timelines for each treasure find, including places and people; key events were then put into each phase. See figure 10 for the Frome Hoard timeline and appendix 7 for the other treasure finds’ timelines.
The next stage was to develop tasks associated with each phase and key events. Each task is broken down into three parts: media, task and result. The media are the materials/resources used by the students to complete the task/questions and the result is how they will report what they have found i.e. to the facilitator, completed worksheet or typed into the chatbox. It was also decided for each phase, in addition to the media specific for each team, that there would be shared media which would be referenced to in the activity sheet. Initially, it was thought that a Gantt chart format might be the best way to present this data. After discussion it was decided to use the following format (figure 11):
**Figure 11:** Media, task and result for the Frome Hoard by each phase with shared media along the top.

<table>
<thead>
<tr>
<th>Phase</th>
<th>DISCOVERY</th>
<th>EXCAVATION</th>
<th>POST-EXCAVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>Task</td>
<td>Result</td>
<td>Media</td>
</tr>
<tr>
<td>Maps</td>
<td>Mapping site and location</td>
<td>To facilitator</td>
<td>Picture cards of tools</td>
</tr>
<tr>
<td>Treasure Team</td>
<td>Who's who cards</td>
<td>Who to send to the site</td>
<td>Chatbox window</td>
</tr>
<tr>
<td>Conservation Team</td>
<td>Decision tree</td>
<td>Determine how best to protect the context</td>
<td>Chatbox window</td>
</tr>
<tr>
<td>Museum Team</td>
<td>Weblinks and worksheet</td>
<td>Research Roman coins and decide which department the coins should go to.</td>
<td>Chatbox window and worksheet</td>
</tr>
<tr>
<td>Media Team</td>
<td>Prepare interview questions for the finder</td>
<td>To facilitator</td>
<td>Videos of Dave Crisp answering FAQ</td>
</tr>
</tbody>
</table>
Example media and tasks

Due to the schedule for the session development, only a few activities had been completed at the time of writing. Below is a list of completed tasks and media for the Archaeology Team with a discussion about the content. The activities slowly build up in complexity, given their exposure to the subject and vocabulary. In the final phase there is no shared media as each group is working within its specific subject area. All activity sheets and media use Calibri typeface, the SDDC typeface for other sessions.

Discovery Phase:

• Phone call script – shared media (appendix 8)
  o The conversation when Dave Crisp tells Katie Hinds about his discovery.
  o The script is taken from the original phone call, but modified to provide more detail and key words for the students’ activities.
  o The final session it will be recorded with actors and there will be a slide on screen with images of Crisp and Hinds (so students have images of people to relate to).
  o A transcript of the call will also be available for the students.
  o This is an exciting moment in the session and the facilitator will gather all students together to listen, thus creating a feeling of urgency.

• Dave Crisp’s photo of the find– shared media (appendix 9)
  o This is the first photograph that Crisp sent to Katie Hinds.
  o Designed to be lower quality in order to create the feeling of the find just being discovered. Later resources will contain better quality photographs.

• Archaeology Team Activity 1 (appendix 10)
  o In this activity, the team locates the find on an OS map using co-ordinates. They look at the surrounding landscape (a satellite image is also provided) and search for other historic sites located nearby. They can also make a phone call to gather more information.
  o There is a definition box where they learn about the word ‘site’ in an archaeological context.
  o They report their findings to the facilitator.

Excavation Phase:

• Excavation photographs – shared media (appendix 11)
  o This media contains ten photographs with captions of the excavation.
o Students will be brought together to look at the photographs and invited to ask questions.

o In addition to the photographs, there is a time lapse video of the excavation (Booth 2010b).

• Archaeology Team Activity 2 (appendix 12)
  o In this activity, the team decides what tools to send to the excavation. An emergency excavation is described.
  o Students download ‘toolkit cards’ which contains fifteen excavation tools with pictures and descriptions, using a ‘tick’ for proper use and a ‘cross’ for inappropriate use. They can also examine the excavation photographs under shared media which has images of archaeologists using tools.
  o Answers are typed into the chatbox window. There are no set answers, but the facilitator will query items chosen, such as a ladder, by asking whether they consider the excavation is deep.

Post-excavation Phase:

• Archaeology Team Activity 3 (appendix 13)
  o Aerial photography is described in this activity and the students compare images of different Roman sites. Unfortunately, given the intrinsic nature of hoard sites, the Frome Hoard did not have any settlements or activities associated with it, so this alternative was developed.
  o There is a ‘fact-file’ sheet to help interpret the images which contains basic information about Roman building layouts. This enables students to use a wide range of media, including written sources and images.
  o Students post their findings in the chatbox, where the facilitator can check the results.
CHAPTER SEVEN
Guidelines for developing a video-conferencing session

Having developed a VC session, whilst not complete, it is possible to set out some general guidelines for further sessions. This chapter aims to provide a summary of what has been discovered through research and what has been observed at first-hand. Although VC is still an under-exploited technology for educational purposes (as discussed in chapter 2), the associated literature provides a clear indication that it has the potential to fill a niche within museum education services. Its fundamental benefit is that it can enable the museum to reach new audiences, notably schools unable to visit the museum. Implementing the technology would potentially open a museum’s collections to a worldwide audience, meaning that schools would have wealth of resources at their disposal to support teaching. What has held it back is its origins in business - the word ‘video-conferencing’ itself produces images of offices and an alien environment for children. It has been suggested that changing ‘video-conferencing’ to ‘video-chat’ or ‘video-conversation’ may help alter preconceptions (D. Hogan pers. comm. 18 July 2011). Popular applications such as Skype and ‘face time’ on the iPhone are also making the technology more accepted and routine in children’s lives. As witnessed by the VC sessions that are currently being run by many museums (chapter 4), the technology is being used but largely on the grounds ‘because it was there’. This highlights the lack of pedagogy, with most VC sessions still using the didactic approach to teaching.

Pedagogy is the key element that needs to be developed when creating a VC session. When considering the structure and content of a session it is important to focus on what the technology can offer that physical visits cannot. The fundamental point is that the facilitator is not physically present with the students; it provides an opportunity for students to connect with an ‘expert’ or a ‘hub’ where they can actively participate in a novel and fast moving scenario. This works in harmony with the ‘virtual reality’ of VC, diminishing that surreal and unnatural feeling of trying to connect with a person who is not physically in the same room. The NSC is an exemplar example of this in practice. When schools visit the museum, the normal practice is to present the students with a series of challenges or tasks requiring teamwork rather than the facilitator just ‘talking’ and answering questions – which is an element that should be applied in VC sessions but has often been overlooked. The purchase of the technology and subscribing to a VC service provider also needs to be taken into consideration. As the technology improves, however, initial set-up costs are decreasing - once bought there are few overheads. The benefits provided by VC far out weigh the costs.
Some general guidelines for creating a VC session are set out below:

• Take into consideration current curricula trends, which are constantly changing. There is a general move towards interdisciplinary education, linking subjects together rather than being separate ‘units’. There is also a trend towards citizenship and local history (as discussed in chapter 1).

• Developing children’s skills in ICT is a major benefit of using VC, especially if the session requires students to download and manipulate data on a computer.

• Fully understand the potential of the equipment and what it has to offer that is unique and provides a different experience from a physical visit. Choose a structure and topic that is highly interactive, so that the distance implicit in VC is counteracted.

• Develop a pedagogy that is influenced strongly by VC technology; one that lends itself to PBL and challenge-based learning with constructivist roots (see chapter 3).

• Before undertaking the development of a session make a project plan (as in chapter 5) to ensure that deadlines are met and the team has a sense of direction. Also keep aware of the end goal and objectives that have to met, so that the project does not become side tracked by other distractions.
CONCLUSION

Having met the objectives set out outlined the introduction, a response can be made to the questions posed. There is a strong demand for VC as demonstrated by the number of sessions already run by a number of museums, but is also backed by the fact that the SDDC receives regular requests from schools to introduce the technology into their service. The use of technology is now commonplace and its applications are second nature to the majority of people, in particular the young who enjoy new equipment and the interest and stimulation they provide. The main reason why there is a demand for VC in schools – some of which maybe in remote areas or even aboard – is that they can gain access to the world’s great collections and experts. This is an exciting prospect in itself and supports and diversifies teaching. In this way students from schools that are unable to visit are not disadvantaged. Other advantages in using VC are the savings in time and money. Health and safety issues in respect of school trips are also overcome.

VC technology is ideal for meeting these needs, as it is a relatively cheap technology to purchase and maintain, especially given the wide ranging choice in models and applications, ranging from complete setups to individual pieces of kit. VC is the ideal solution for schools and museums to make contact over long distance. With its installation, a whole range of opportunities are opened up - schools can gain access to a wide range of specialist institutions while museums can broaden their outreach and services. However, beyond fulfilling this basic need, the major issue with VC is the lack of pedagogy – more work needs to be done in this area – the session developed in this dissertation demonstrates the possibilities. A new VC pedagogy can be developed to suit the curriculum and to provide exciting activities quite different from standard learning experiences. VC has the potential to create that ‘wow’ factor that can initially draw the students into the activity and get them fully involved in the actual content of the session. There is a niche for VC within schools, where it can supplement, support and create variety in teaching.

The basics of a newly developed VC session are set out within this dissertation. It demonstrates the unique format offered by this technology, using challenge-based learning as its foundation to create activities that are highly engaging and social, whilst incorporating the physical distance of VC into the storyline. These are the key elements to successfully implementing VC sessions. The session in this study is based upon the work of PAS and these activities show that archaeology can be used in exciting and inventive ways to
educate, comfortably fitting in with the curriculum in a range of subject areas. The strength of archaeology lies in its interdisciplinary nature and the application of practical skills; it links subjects together allowing for students to gain a complete picture of how different disciplines connect. The findings and guidelines in this study could readily be applied to other museum or heritage based organisations. There is room for further research in this subject area, notably in the field of evaluation given the current limited amount of evidence of learning outcomes from VC. The completion of the ‘Treasure Challenge’ session and its piloting would provide an ideal opportunity to expand this body of research.