51 The Roman conquest of Britain: a computer–based educational package

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Abstract
This computer–based educational package was commissioned by English Heritage. The software team comprised two middle school teachers and a computer professional. The package contains a large amount of archaeological information on sites in Roman Britain, including Richborough, Colchester, Maiden Castle, Wroxeter, London, Verulamium, The Lunt, South Shields, Chesters, Carrawburgh, Housesteads and Vindolanda. At each stage of the simulation a coloured computer graphics screen is presented, together with appropriate sound, and the keyboard is employed for human–computer interaction, allowing a selection of different outcomes, each of which is scored on its appropriateness in the set of circumstances presented. The pupil is able to take on the personality of real characters such as Roman soldiers (names taken from selected tombstones), Vespasian, Claudius and Boudica. Several archaeologists have remarked that the simulations have raised points which they did not previously appreciate. The package has been subjected to extensive testing in a school environment, and has been used to teach the history of the Iron Age tribes of Britain, the Roman invasion, and details of military life. It will be published soon by English Heritage.

51.1 INTRODUCTION

When I was asked by Mike Corbishley whether I would be interested in writing a computer–assisted learning package for English Heritage, on the subject of «The Roman Conquest of Britain», and I answered «Yes, I would love to», little did I know how long it would take. At the time it seemed a nice way to combine my lifelong interest in the Roman period of archaeology and my profession of Computing Science. Although I had long been involved with schools computing through my membership of the Schools Committee of the Staffordshire Educational Computing Centre, run by Staffordshire County Council, I needed some teachers committed to the imaginative teaching of Roman history as colleagues for the project. I was soon introduced to Linda Goodwin and Lynn Kelly, teachers at Middle Schools in Staffordshire and experienced in teaching children of ages 9–13, the target age range for the package. They were the source of all the pedagogical principles embodied in the package, while I checked the archaeological accuracy of the situations, besides doing all the computer programming. What has resulted is an educational package with unique detail of Roman Britain and the Roman Army, while providing a lively teaching environment. Although in principle the package could be operated on any computer platform, the first implementations were on the Acorn BBC Model B and the Acorn Archimedes, simply because these computers were the most common in British schools in the late 1980s. This resulted from an earlier schools computing equipment policy of the Government.

51.2. PREVIOUS WORK IN THE FIELD

In the early stages of the design process, a search was made for the existence of computer–assisted teaching packages on an archaeological theme. There are many such computer packages with British archaeological and historical themes specifically aimed at schools. The following is a list believed to be comprehensive in early 1992:

- *1066: The Conquest* (John Clare). Appian Way Software, Durham [Normans and Saxons]

- *1665: Plague of London.* Tressell Publications, Brighton [Medieval]
- *1914* (Netherhall Educational Software). Cambridge Micro Software, CUP, Cambridge [First World War]
- *Apprentice.* Scetlander, Glasgow. [Industrial Archaeology, 17th Century]
- *Archaeology.* Cambridgeshire Software House, St Ives, Cambridgeshire [Excavation]
- *Attack on the Somme.* Tressell Publications, Brighton [First World War]
- *Battle of the Somme.* Oak Solutions, Idle, West Yorkshire [First World War]
- *Canal Builder.* Longman [Industrial Archaeology, Canal Transport]
- *Castle Life.* Oak Solutions, Idle, West Yorkshire [Medieval]
- *Data–100 Series.* Appian Way Software, Durham [Includes topic disks on *The Second World War, World War 2:The Home Front, The Poor Laws, Medieval Life, Early Railways, The 1914–18 War, The Vikings, The Coming of the Factories, The Rise of the Roman Empire, Everyday Life in the Roman Empire, Roman Britain*
- *Designer Castles and Medieval Villages.* Data Design, Barnsley [Medieval]
- *Dig for History.* Durham County Council [Excavation]
- *Digging Deeper into History* (Martlew). English Heritage, Ruislip [Excavation]
- *Drover.* Scetlander, Glasgow [Medieval]
- *Elizabethan Court.* Longman [Medieval, Tudor social/political study]
- *Forge.* Resource, Doncaster [Industrial Archaeology, coal/iron working]
- *Frontier 2000.* Cambridgeshire Software House, St Ives, Cambridgeshire [The history of the border regions around Carlisle, including Hadrian's Wall, Roman Times, Mary Queen of Scots, The Solway Firth, Bonnie Prince Charlie, The Civil War, and Railways]
- *Germany Between the Wars.* Tressell Publications, Brighton [Second World War, a combination of *Origins of 2nd World War* and *Rise of Nazi Germany*, see below]
- *Godfrey.* AVP, Chepstow [17th Century religious/political study]
- *Investigating Local Industry.* Oak Solutions, Idle, West Yorkshire [Industrial Archaeology]
- *Landmarks Second World War.* Longman Resources Unit, York [Second World War]
- *Landmarks The Victorians.* Longman Resources Unit, York [Industrial Archaeology]
- *Mary Rose — The Anatomy of a Tudor Warship.* Cambridgeshire Software House, St Ives, Cambridgeshire [Underwater archaeology/ 17th Century artefact study]
- *Medieval War and Peace.* AVP, Chepstow [Medieval social/political study]
- *Microworld of the Vikings* (Martin, A. in *Computer Education* 12 (1988), pp. 169–172) [Vikings]
- *Nero is Dead* (Martin, A. in Tagg, F. and Tagg, E.D. (eds) 1988 *Computers in Education,* Elsevier, pp. 279–282 [Roman economics/political study]
- *Origins of 2nd World War.* Tressell Publications, Brighton [Second World War]
- *Quarry Bank 1851.* Heinemann [Industrial Revolution]
- *Rise of Nazi Germany.* Tressell Publications, Brighton [Second World War]
- *The Saxons.* Garland Computing [Saxons]
- *Shallow Hill.* AVP, Chepstow [Iron Age]
- *SyGraf* (Molyneaux, Wheatley, Rahtz). UGC/CTI, CTI Centre for History, Glasgow
- *Time Traveller.* Sulis Software [Bronze Age, Roman Britain, 11th,16th,19th Centuries]
- *Time Travellers' London.* GSN [Ten time zones applicable to the London area]
- *Titanic.* ESM, Wisbech [Excavation]
- *Unearthing the Past* (Sherward and Garth). Cambridge Micro Software, CUP, Cambridge [Excavation]
- *Viking England Series.* Fernleaf Software [Includes programs *The Raiders, Journey's End, The Move,* and *The Jarl* on the Viking Period]

About an equal number of packages of archaeological interest written by non–British authors (chiefly from the USA) also exist, and there are some written by British authors for areas outside Britain for classical archaeological periods or colonial themes. Special mention should be made in the last category of the package *Into the Unknown* (Tressell Publications, Brighton).

Dean and Nichol (1984) produced a simulation of an archaeological dig, designed for use by children aged 11–14 years. The resource booklet which came with the program contained records of Viking burials, a glossary of terms, and photographs and drawings of a burial mound and its contents. The package forced pupils to ask for information, to follow up clues, and to examine in more detail any excavated object or feature of the mound. The aim was to produce an imaginative reconstruction of the mound, and a teacher's encouragement in discussion and structured follow–up work was essential.

O'Flaherty (1988a; 1988b) developed the Southampton–York Archaeological Simulation System

(SYASS), a joint project between the Departments of Archaeology at the Universities of Southampton and York, funded by the UGC/Computer Board *Computers in Teaching Initiative*. It was designed to demonstrate excavation technique and strategy and was intended for university undergraduates. This was supplemented by a graphical user interface using mouse and interactive buttons in the SYGRAF implementation (Wheatley, 1990).

Ann Sherward and John Garth (1989) have produced a package *Unearthing the Past* based on a complex urban site, using finds from an archaeological dig at the Coppergate site in York (Jorvik). It contains an array of resources for learning about Roman, Saxon, Viking, and Medieval life in Britain, including a passive database, which is used by pupils to peel back layers of soil to reveal finds and structures, a teachers' guide and study sheets, pupils' dig notes, information about the Vikings, and individual finds report cards. This simulation is certainly faithful from an archaeological excavation point of view; but teachers without a knowledge of modern archaeological methodology might experience difficulty. There is a danger that the emphasis on realism may prove too boring to the intended users, with a consequent loss of their interest.

Roger Martlew (1989) has created a computer–based simulation *Digging Deeper into History* for lower secondary school pupils which explores the impact of a new gas pipeline on eastern Yorkshire. Besides the computer data files there are worksheets, resource cards, and a booklet containing background information on the prehistory and history of the area. The pupils are meant to investigate the impact of the different pipeline routes on archaeological sites and on the landscape by taking on the roles of planning officers, before producing a report to the District Council on their findings, plus an address to a Public Enquiry presenting what has been learnt about the archaeology along the routes. Role play also includes acting as journalists, radio/television reporters, public relations staff, and residents. The Teachers' Guide gives many ideas about how the material can be extended across many subjects in the curriculum.

1665:Plague of London introduces pupils to conditions in London in the 17th Century, including the bubonic plague. Pupils are cast in the role of people in London who are concerned with the health of citizens in their area; they form a health committee to decide what to do about a major outbreak of plague which faces them in the summer of 1665. As the months go by they have to face mounting problems and make decisions about what to do to improve the situation. This is yet another package which demonstrates the value of pupils having to make decisions based on their knowledge of the time period and conditions.

1914 contains a simulation of a six–week period at the start of the First World War and gives pupils an opportunity to make military decisions on the basis of information available, and to explore consequences of these decisions. Because several outcomes are possible the program stimulates discussion among the pupils. There is extensive support material including a map and information sheets.

Shallow Hill is a simulation of a fictitious Iron Age site discovered during the construction of a motorway. Pupils learn how evidence may come in a variety of forms, including pottery, stone, discolouration of the soil, etc. and they learn how the present landscape covers layers of past landscapes.

Elizabethan Court is an adventure game which gives pupils the opportunity to explore a royal palace during the reign of Elizabeth I. The aim is to gain a seat on the Privy Council. On their way through the palace, pupils learn how the conventions and power structures of the 16th Century affect their decisions.

Drover covers the transition from subsistence farming to trading in agricultural produce. The droving of animals was a method of generating income from sales at a central market. It had many physical and financial risks. In this program pupils take on the role of a drover taking a herd of cattle from a farm to a market town many miles away. Problem solving and good decision making are essential to the success of the trip, finally reflected in a good financial statement. The package focuses on historical and environmental issues, such as toll roads, etc.

Attack on the Somme is a computer–assisted learning package designed to introduce the technicalities and details associated with a major Allied attack on the Western Front in France in 1916. The introduction includes sections on the trenches, tunnelling, preliminary bombardment, ground and air observation, attack formation and creeping barrage. The attack simulation uses animated graphics to involve pupils in the kinds of decisions which faced the military leaders. The outcomes of these decisions and judgments are shown and further issues are raised.

Apprentice is a historical and social study of industrial life in the 16th and 17th centuries. Pupils adopt the role of a young person hoping to become a master baker, and they discover that there are many aspects which are not readily apparent at the outcome. Topics covered include baking bread, burghs, guilds, mills, diet, and civil defence.

Canal Builder puts pupils in the role of canal builders during the Industrial Revolution. Using a screen map of North–West England in 1770, rival companies aim to build canals across the Pennines to link the growing inland textile and mining towns of Lancashire and Yorkshire with outlets to the coast. The slow progress of canal building is related to the required major works, water supply problems, the need to raise extra funds, wars, financial crises and the building of other canals. Pupils then compare their own results with the actual canals eventually built across the Pennines, and with the abortive schemes proposed during the period.

Viking England allows pupils to explore the world of the Vikings, by using their imagination, organising data, using evidence and taking decisions. *The Raiders* covers loading a boat, choice of sea route, where to land and set up a camp, how to explore the interior, planning a settlement, moving inland, and finally settling down. *Journey's End* concern the placing of the settlement by an estuary and problems with other Viking groups. *The Move* covers moving inland and setting up a town near a Saxon settlement. The town succeeds only if sensible decisions are made about the cooperation of the two groups. *The Jarl* allows pupils to take on the role of the merchants, including the important citizen the Jarl, going about his business in the court, at the docks and on the farms.

The Saxons follows the lives of an imaginary family, involving the keeping of a detailed year–by–year journal of life in Saxon times.

Time Traveller is a multiple choice history quiz, involving escaping from pursuers in the Bronze Age, Roman Britain, 11th, 16th and 19th centuries to get back to the 20th century. There is a points scoring system.

Time Travellers' London presents ten different time zones in the London area which pupils may visit. Assignments are given, and investigations stimulated by computer graphics. Pupils are transported through time, and they may then select a view from the timeship, information on the time zone, and discussion about representative artefacts from the time zone. Examples are hunting with a Stone Age tribe, watching the Roman invasion of Britain, and witnessing the Great Fire of London.

Quarry Bank 1851 uses the 1851 census records for Quarry Bank, near Dudley in the Black Country, to perform statistical analysis relevant to this period of the Industrial Revolution.

Applications of CDROM or interactive videodisk in archaeology are not mentioned here, since few schools have access to such equipment at the present time; no doubt this situation will change as hardware becomes cheaper.

51.3 THE ROMAN CONQUEST OF BRITAIN DESIGN PHASE

Because English Heritage wished to explore the possibility of using some of its sites in conjunction with the package, Maiden Castle was used as an initial case study.

In the early design phase with English Heritage, Putnam & Putnam (1985) suggested four reasons for using computers to educate children:

1) to give children experience of computers and their associated equipment for use in later life;
2) to give children realistic experience of information handling and problem solving;
3) to provide individual repetitive testing of knowledge and skills in almost every part of the curriculum, by straight drills, or preferably disguised in the form of a game;
4) to enhance hand–to–eye coordination.

The success of computer arcade games leaves little doubt that children are motivated to use computers for "fun" or game use, and the hand–to–eye coordination, while relevant to keyboard usage, has become even more important with the use of the mouse. It was thought that an arcade game Romans v. Britons was certainly feasible, but English Heritage was not in the games market, and long–life quality software should be the aim. The need for computer literacy is obvious. Some children find it easier to achieve coordination skills and some degree of personal confidence through hands–on experience of the computer than through any other teaching method, and this can justify even the use of arcade–type games. However, information handling and problem solving is by far the most important use of computers in the school environment. In the field of testing of knowledge and skills the computer can provide the child with individual attention which the teacher cannot give. Nevertheless it is important to remember that the computer does

this far worse than a skilled teacher; its questions and answers are limited to what has been put in the memory, it cannot recognise nearly correct answers (except by the use of very advanced artificial intelligence techniques), and it cannot help those in difficulty except by the use of pre–programmed remedial routines. However, the child can work at his or her own pace and refer to the teacher when in need. A simulation of an archaeological dig (e.g. Dean & Nichol 1984) was thought not to be very interesting to the age range proposed (9–13 years). A simulation of Roman Britain seen through the eyes of a Roman soldier, with some game aspects involving scoring, and incorporating a module on Maiden Castle, was thought to be much more viable. The question and answer style of presentation for the history of Maiden Castle, incorporating the discoveries from the excavations of Wheeler and Wainwright, would also be possible. The choice of platform for the computer package would be very important, and wherever possible the package should be made available for a number of platforms in common school use and for industry–standard machines. The choice of Maiden Castle was thought to be a good one, but many other sites could be included. The initial proposals for a database of real data on Maiden Castle were finally rejected, because it was thought that the concepts of database, pre–excavation, survey, excavation and post–excavation were too complex for the proposed age–range of the pupils.

Lavery (1985) proposed a package containing background material based on the historical and archaeological contexts of Maiden Castle, and existing planning policies relating to the site and its environs, followed by the preparation of a development plan consisting of the location and development of a visitor centre, site management considerations and interpretation of the site. This was thought to be of sixth form, or even undergraduate standard, however, and not particularly suitable for the 9–13 age range proposed.

Wolfson (1985) proposed a package containing a database for Maiden Castle, with the underlying problem «Was Maiden Castle primarily a refuge in times of trouble, or a site of continuous settlement?» to be solved. The database was to include documentary, visual, artefactual and map evidence, geographical data and computer reconstructions. Problem solving exercises were to be based on the presented evidence, on extracts from secondary sources with questions such as «On what evidence was this statement based?», and on the construction of a data chart to illustrate different periods of the site development, extent of the fortifications, numbers of occupants, etc. The proposal to use an expert system was thought to be ambitious. The overall proposal was not adopted.

To summarise the early design stages, four main types of package were discussed:

1) A simulation involving real archaeological data from an excavation, e.g. the excavation of Maiden Castle by Wheeler, and the 1985–1986 second excavation by Wainwright. It should be noted that similar packages have been produced by Martlew (*Digging Deeper into History*, published by English Heritage) and Rahtz (*Sygraf*, for the archaeological departments of the Universities of Southampton and York).
2) A program presenting information about the history and archaeology of Maiden Castle in the question and answer style, accompanied by teachers' guide and worksheets. It should be noted that this was eventually to become the design, using several sites, for *The Roman Conquest of Britain*.
3) An adventure game in the genre of Tolkien's *The Hobbit*, presenting a fictional adventure of a Roman soldier in Britain in words and graphics, describing situations and inviting decisions as to the next move. Some aspects of this were eventually incorporated into the present package, but strictly in respect of graphic descriptions of real archaeological situations.
4) An arcade style game presenting a battle between Romans and Britons involving appropriate situations and weapons.

The eventual design of the package became a combination of approaches 2 and 3 above.

51.4 THE FINAL DESIGN

The aim of the extensive package of learning materials *The Roman Conquest of Britain* is to involve pupils in a variety of experiences connected with the Roman invasion and conquest of Britain. This is achieved by a computer–assisted simulation of the Roman invasion of Britain and its consequences.

The teachers' handbook gives full directions for the use of the package and also provides further information on the many aspects connected with the topic. The learning package consists of four modules as follows:

- Invasion
- Advance to the West

- Revolt
- The Northern Frontier

These are in chronological order, but may be used independently as a separate teaching/learning resource.

To enter each module the pupil is transported back in time to the period of the Romans using a "Time Machine", involving switching from modern to Roman–style clothes. Background knowledge about the Romans is given at each stage, and then the pupil may choose one of the modules to investigate. This is achieved by the pupil taking on the role of a real character involved in that event, such as a Roman soldier (names taken from tombstones), Claudius, Vespasian, Boudica, etc. Care is taken to involve girls as much as boys. While many of the simulations described above are open–ended in nature, relying on the pupil to know what direction to investigate, the view was taken that the present package should be mostly goal–directed, with a scoring system for correct goals achieved, in view of the target age group of 9–13 years. Decision making is an important element of the package. The result is a wide–ranging learning package which offers the facility for in–depth study or alternatively for a short focused study of one aspect. The package provides enough material for anything up to a term's (i.e. one third of a year's) work. The package is designed as a resource for pupils ranging throughout the National Curriculum Key Stages Two and Three.

The Romans, according to the *Interim Report on History in the National Curriculum*, are studied by 43% of children aged 11–12 years, but this period is much less studied in the later years. The aim of the package for the 9–13 age range is designed to cover "political" themes such as the Roman invasion, Boudica, etc., "economic, technologic and scientific" themes such as economic motives for the invasion, and "social and religious" themes such as everyday domestic life in town and country, gender roles, baths, and army life. Children should enjoy using the package, be shown how to use it, and above all have hands–on experience; this stratagem is based on the ancient Chinese proverb «Tell me — I forget; show me — I misunderstand; but allow me to do it — and I will understand».

51.4.1 Introduction

The package always begins with an entry frame, predominantly red in colour, with four legionary shields in yellow with black design, the crest SPQR ("The Senate and the People of Rome"), the title THE ROMAN CONQUEST OF BRITAIN in white, and the instruction «Press RETURN to continue» (the last to get the pupil into the habit of using the strongest key on the keyboard for the majority of single–key continue commands). There follows the copyright frame with the English Heritage logo, title, authors' names and date. After this there is some background information on the Romans, showing their country of origin and the extent of the Empire prior to the Claudian invasion. One of the interactive techniques employed is multi–choice, and this is used for a 3–out–of–5 choice for equipment to take. A running scoring system is also employed, with larger scores for the best choices. In general the questions are repeated until the correct answer is supplied. A 1–out–of–5 single response is used to determine the best choice of transport to Britain. At the end of each module the final score is given, together with a promotion or demotion to a new army rank depending on performance.

The pupils are told about the four legions who are taking part in the conquest of Britain, and then have to make a menu selection for one of the four modules **Invasion, Advance to the West, Revolt** and **The Northern Frontier**. They make their choice and are then transported in the Time Machine to the selected period, involving a change of clothing from modern dress to Roman dress.

51.4.2 Invasion

This module covers the events in 43 and 44 A.D., the landing at Richborough and the advance to Colchester. It includes the battles of the Medway and Thames and concludes with the capture of Colchester under the personal command of Emperor Claudius. The pupils play the part of Marcus Favonius Facilis, centurion of LEG XX, and have to make several decisions of a multiple choice nature as they simulate his part in the invasion.

51.4.3 Advance to the West

In this module the pupils follow the advance of the legions to the Fosse Way frontier line. They are given the choice of which of the three legions II, XIV and IX, to join in order to discover the role which these legions played in the advance.
LEG II. Pupils take on the role of Titus Flavius Vespasianus, Commander of LEG II, and later Emperor. After the taking of VECTIS (Isle of Wight), the chief activities in this module are the strategy and action for the capture of Maiden Castle, including a description of hillforts, Roman artillery, and the TESTUDO.

LEG IX. Pupils take on the role of Gaius Saufeius, soldier of LEG IX, and take part in surveying a road using the groma, followed by selection of materials and methods for the construction of Ermine Street.
LEG XIV. Pupils take on the role of Marcus Petronius, standard bearer. After a typical route march between forts, this module covers the construction of forts in general, including temporary camps, gates and corner towers, and the layout of roads and buildings within the fort.

51.4.4 Revolt

This module includes the disruption created by Boudica's revolt in 61 A.D. Pupils take on the role of Boudica. The Roman advance to Mona to quell the Druids begins the module, followed by the opportunity taken by the Iceni and Trinovantes to burn Colchester, London and Verulamium. The burning of the Temple of Claudius, and the throwing of the head of Claudius into the River Alde are graphically portrayed. The module finishes with the battle at Mancetter, including an animated battle plan, the suicide of Boudica, the destruction of the territory of the rebels, and the training of British horses by the Romans at the Lunt fort.

51.4.5 The Northern Frontier

The module commences with a description of the advance into Scotland under Agricola, followed by the decision to consolidate the northern frontier line at Hadrian's Wall. Included in this module are decisions about the location of the frontier line, materials for the construction of the wall, forts, milecastles and turrets. A full map of the wall, including all forts, milecastles, and turrets, rivers, the estuaries of the Tyne and Solway, and the route of the Military Way, is simulated on the computer, and pupils are able to travel to eight selected sites which receive extensive treatment. These sites are South Shields (supply base fort layout, granaries, and a description of the famous tombstone of Regina, wife of Barates); Corbridge (supply base fort layout); Turret 26B (method of construction); Chesters (fort and bath house layout); Carrawburgh (Mithraic temple, Coventina's Well); Housesteads (fort layout, hospital, latrines, hygiene); Vindolanda (writing methods); and Milecastle 42 (method of construction). On completion the traveller returns to South Shields and thence to London by ship, receiving a final score.

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