

BURIAL MOUND - A SIMULATION OF AN ARCHAEOLOGICAL  
DIG

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Abstract The relatively new computer language PROLOG enables the non computer expert to write a range of programs which can help the archaeologist. Prolog is excellent for the construction and querying of databases. The archaeological use of Prolog has developed through the writing of a number of programs for teaching History to 11-14 year old pupils. One of these is MOUND DIG, a program which simulates the archaeologists' excavation of a Viking burial mound on the Isle of Man. The computer contains information about the contents of the burial mound. The pupils can extract information from it as if they were carrying out the excavation. On the basis of the evidence which the computer contains they can formulate their own ideas about the burial and the light which it throws upon Viking culture.

BURIAL MOUND

MOUND DIG is one of a number of archaeological programs we have written in the past twelve months for the teaching of History to 11-14 year olds. The programs are an element in a small scale developmental project at the School of Education, University of Exeter, for the application of PROLOG to History teaching. The archaeological programs number four out of fourteen, and represent archaeological topics covered in the pupils' normal course of study. They

are :

- BOGBOD - a simulation of an enquiry into a body found in a Danish Bog
- ARCHIE - a simulation of the Sutton Hoo excavation
- MOUND DIG - a simulation of the excavation of a Viking burial mound
- TAXES - a taxonomic expert system for the classification of the remains of early man and his ancestors

In addition the program PLACES - place-names expert system - has potential use for the archaeologist.

Why ask the pupil to simulate the work of the archaeologist ? Such activity reflects an approach to the teaching of History which sees it as a process of enquiry which deals with the evidence which the past has left behind. This is in contrast to studying History as a received body of knowledge based upon secondary sources in which primary sources have a merely illustrative or decorative function. Pupil involvement in the historical process develops a whole range of thinking skills from the affective to the more purely cognitive. In squeezing historical evidence, by teasing out the associated strands of inference, deduction and hypothesis and through the application of informed imagination pupils can embark upon a plausible reconstruction of past events and situations, and develop an understanding of their causes and consequences.

The procedural approach to History teaching would be naive to expect its students to function as fully fledged historians with access to the raw historical record. Such teaching is a cooperative exercise which involves both the teacher and

pupils in solving the historical puzzles which the past has left behind. For historical problem solving to occur in the classroom the historical record has to be produced in a usable form. When it comes to archaeological work it is regrettable that it is impossible for the normal form in its one hour of history a week to embark upon an archaeological dig. Even more galling is the impracticability of whisking the pupils and the hard pressed teacher off to some archaeological site of their choice, whether it be a Danish bog or the tomb of Tutankhamun.

A partial solution is to get the pupils to simulate the archaeologist through the use of a computer, or to use the computer to process a discrete mass of data so as to produce information upon which conclusions can be based. In the program BOGBOD the class is asked to follow up clues and draw conclusions about a body found in a Danish bog. MOUND DIG and ARCHIE adopt the different tactic of asking the pupils to simulate the archaeologist at work. Before discussing MOUND DIG in detail an account of the role of the computer language PROLOG will help explain the nature of the program. PROLOG is being used in a modified form for use on micro-computers. The version is known as micro-PROLOG. micro-PROLOG can be written in a form of natural language which is readily understandable. Statements in micro-PROLOG can be entered into the computer in discrete blocks. These blocks take the form of a sentence or sentences. The sentences form the database. The database can have rules applied to it. These rules take the logical form :

a is b if b is c

The application of rules to the database makes PROLOG a very powerful language for processing information.

Micro-PROLOG enables the construction of large databases which can be efficiently queried by the user.

One such database is MOUND DIG. It simulates the excavation of a Viking grave at Ballateare, Jurby, on the Isle of Man. It was written for lower secondary school pupils (aged 11-14), although we have found it usable by children of all ages. The program's aims are :

- a) To illustrate the methodology of archaeologists and historians
- b) To allow for the imaginative reconstruction of a Viking funeral
- c) To provide a concrete base to pupils' knowledge of Viking life and customs. The burial throws light upon the structure of Viking society, its ceremonies, its agrarian and trading economy and its cosmopolitan nature.

The program is hopefully written in clear, simple English which is accessible to the wide range of abilities we encounter in our teaching. In selecting which information about the burial to enter into the computer some details have been omitted, for example, those about the construction of the coffin. This particular topic was chosen for a variety of reasons. A major one was that all Viking life seemed to be there - the burial mound contains a genuine mystery. Through the presence of a female body which seems to have met an unfortunate end the subject caters for the interests of both classroom genders. The Ballateare burial also neatly ties into documentary evidence which survives about Viking burial customs. A second reason for simulating Ballateare was that the topic was a manageable size and had a clearly appropriate structure for the computer. There were

not too many objects or other factors to be taken into consideration. The amount of information fits neatly into the available memory of the computers which can use MICROPROLOG. The simulation can thus simulate the extant volume of knowledge and thus mirror in a realistic way the work of the archaeologists involved in the excavation. The final factor for choosing Ballateare was that it fitted neatly into the time scale available for teaching the topic. Working through the program, discussion, filling in outline maps, reading the source material included in follow up documentation takes approximately 1-1 $\frac{1}{4}$  hours.

MOUND DIG falls into roughly three sections.

A) The pupils are given a choice of four possible methods of excavating the mound. They are briefed about the site and nature of the mound. Choices A and D are non professional and impractical, and if they are chosen the pupils receive an appropriate message and a directive to choose again. For example, if their choice was method A, which is to tunnel into the mound from the side, the computer will tell them :

Method is a bad choice. You would disturb the layers above you. Choose again.

Methods B and C are both archaeologically sound, although C, the quadrant method was the one originally chosen to excavate the mound. Method B involves stripping the mound from the top, layer by layer. If it is chosen the pupils get the reply :

Method is a good one. The only problem is that you would never get a vertical view of what is in the mound. Go ahead or choose again.

B) The simulation of the dig itself. Pupils are given a diagram showing a cross-section through the mound - see fig. 1. They then excavate the mound, layer by layer. Thus, they begin by instructing the computer to :

dig layer1

The computer replies :

layer1 contains modern soil.

There are twelve layers altogether. As the pupils progress downwards they record their finds on their mound diagrams. We simultaneously put up an overhead projector transparency showing the exact positioning of the mound's contents, so that the pupils' records may be as accurate as possible.

C) Each feature the pupils uncover can be investigated in more detail, using the keyword "Tell-about"

For example, the request to :

Tell-about turves

elicits the response from the computer :

Turves were each more than 20cm thick. Over 500 sq. metres of ground had been stripped to get enough turf for the mound.

The soil in the turves was different from the fine sand around the mound.

The nearest matching soil was 90 metres away.

The resource booklet which accompanies the program contains contemporary records of Viking burials, a glossary and photographs and drawings of the burial mound and its contents. The computer's description of grave goods contains page references to drawing of these goods.

In using the program pupils are not in any way spoonfed. They are forced to ask for information, and will learn nothing if they take a passive role in the enquiry. If they fail to follow up clues and examine in more detail any excavated object or feature of the mound their imaginative reconstruction of the burial will be limited. Obviously the teacher's encouragement of discussion and use of the structured follow-up work are essential, see appendix.

#### References

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Jones, G. (1973) A History of the Vikings, OUP

Fig. 1.

CROOK KEEILLEIG, THE MOUND AT BALLATEARE.



45

1 metre

9 - REMAINS OF THE KNIFE



10 - THE BRONZE PIN



## VIKING BURIAL - FOLLOW UP WORK

- (1) Write a report on the burial at Ballateare from the viewpoint of the archaeologist.

Produce your report under these headings :

- a) Background - the mound, position, ideas about
- b) The layer of ashes
- c) The posthole
- d) The women's body - skull - who was she
- e) The mound - the nature of the turves
- f) The gravepit
- g) The body - who might he have been
- h) The gravegoods - numbered 1-8

Reconstruction of the burial

- The death / the body / getting ready for the funeral
- The funeral / the mound / the ashes / the women's body / the man's burial / the grave goods
- The nature of the burial - what the ceremony meant

- (2) The VIKINGS wrote stories or sagas about their past. Tell or write a saga from the viewpoint of the brother of the dead man, telling of his death, funeral, the beliefs of the people at the funeral, the kind of person the dead man was

or

Write a similar story to that of Ibn Fadlan about the Viking burial on the Isle of Man from the viewpoint of a Christian missionary who had just arrived to convert the Vikings to Christianity.

- (3) - How much trust can we place upon the EVIDENCE found at Ballateare to tell us about the Vikings  
- How would you test that the EVIDENCE is about the Vikings

## BURIAL MOUND

You are a member of a team of archaeologists which is about to dig up a mound. The mound is in the disused yard of a farm. The mound lies on a slight rise about 500 metres from the sea. To the south the ground slopes gently down to the Killane river, the parish boundary. The river is less than a quarter of a mile away in a wide marshy valley. To the north and east the ground is flat. From the site there is a wide view over the sea, the distant mountains to the south and the plain to the north

Local legend says that the mound is a burial mound, and that anyone who digs into it will suffer a terrible punishment. Today no one believes this, and the mound is such a nuisance that the local farmer wants it removed. The farmer has asked your team of archaeologists to dig up the mound before he levels the area.