The design, implementation, and assessment of software for use in the teaching of history

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THE DESIGN, IMPLEMENTATION, AND ASSESSMENT OF SOFTWARE
FOR USE IN THE TEACHING OF HISTORY

N.J. Morgan, M.S. Moss, R.H. Trainor (*) and A.T. Wilson

Abstract: (1) In recent years nine arts-related departments at
Glasgow University have been successful in winning funds for the
creation of large databases. Although these data are being exten-
sively exploited for research, the great potential they offer for
undergraduate teaching remains largely untapped due to the lack of
suitably tailored software and hardware provision.
(2) Our objective is to give arts-based students access to these
complex highly structured data in the classroom without requiring
them to master difficult operating systems. In this way they would
gain valuable transferable skills in information technology. These
will enhance the historians' traditional skills of evaluating,
interpreting and presenting evidence, long recognized as useful by
employers.
(3) The scheme will require the establishment of a centrally sited
teaching laboratory comprising sixteen micro-computers and fileser-
ver linked to the mainframe through a communications PAD. Chosen to
ensure a maximum degree of compatability, the micro-computers (with
the appropriate operating system) will be capable of acting as
terminals, as a local area network or as single workstations. A
facility technician will be employed to supervise the lab's day-to-
day running, leaving a programmer/analyst to concentrate exclusive-
ly on applying and developing software for the three designated
courses.
(4) The software will enable students to access and scan files with
ease and submit complex search, correlative, and quantitative re-
quests by means of a friendly user interface. It will be possible
to generate output in alphanumeric and graphic format either on-
line or in hard copy. Throughout, priority will be given to trans-
ferability and portability, particularly in relation to the comple-
mentary project at the University of Edinburgh.
(5) The project will be directed by Dr.R.H. Trainor consulting
with a committee representing the participants - the departments of
Modern History, Scottish History and Economic History, the Univer-
sity Archives, the Wellcome Unit for the History of Medicine - and
the Computing Service. The latter will provide overall technical
supervision. The department of Computing Science will co-operate in
formulating an academic staff development programme. With the help
of the University adviser on teaching methods the designated cour-
ses will be closely monitored in order to assess the value of the
particular software, hardware and teaching methods in the project.

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i. INTRODUCTION

The Faculty of Arts acknowledges the increasing importance of information technology for graduates in arts-based subjects. Aiming to maximize transferable skills, it seeks to make computers as important in the classroom as they have become in the workplace. It is widely recognized that the computer has a role to play in the teaching of subjects such as psychology, archaeology, music, philosophy, languages and history equivalent to its role in the teaching of engineering and the natural sciences. The broad basis of both ordinary and honours degrees in the humanities at Glasgow provides an excellent environment for such applications. The Faculty has already taken an initiative in this area by agreeing to develop courses which build on an existing commitment to the use of computers for research. There is, however, a lack of suitable software, programming support and hardware available to its members to realize these objectives in undergraduate teaching. Although there are other areas where Information Technology is being applied to teaching, the Faculty is giving priority to this core proposal to facilitate the assessment, design and implementation of software for use in the teaching of history. The Faculty believes that the expertise gained and facilities created will improve the computer environment for the arts-based subjects as a whole.

2. WHY HISTORY?

Employers and educators have long regarded history as especially well suited to the training of 'men of affairs'. History forces students to make judgements on a range of problems (varying by place as well as by era), using disparate sources and techniques. This utility is enhanced by the power of the computer to store and manipulate large historical data sets, in the process unlocking sources which were not previously accessible because of their bulk and complexity. Schoolchildren are already experiencing the way in which this new literacy can enrich the study of history; they naturally expect to develop their historical and computing skills further at university. These skills are rightly regarded as directly transferable to the workplace and therefore as an essential ingredient in their education.

History occupies an important place in humanities teaching at the University of Glasgow with forty-two UGC-funded posts and about 1.000 undergraduate enrolments. It sustains a dynamic research base, with internationally respected scholars, several of whom participate in externally funded projects which, in some cases, make extensive use of computers. Initiatives are being taken to introduce this new technology to undergraduate teaching, notably by the New Blood Lecturer in Scottish History. Glasgow is particularly well suited for such ventures, due to its long-standing commitment to the collection of research-generated databases, many of which derive from the University's extensive archive holdings. Much of this data, in the nature of complex historical sources, is awkwardly structured and even if expressed numerically cannot be analysed statistically. Thus, although a number of these databases are held in machine-readable form, they cannot, without extensive technical/programming assistance, be easily translated into undergraduate teaching material. Whereas a recent grant for software development at Edinburgh is centred around data sets stored in regular files, our requirements demand specialized programs which handle enduring databases. While the Edinburgh application focuses on statistical analysis of numeric data, our concern is to develop a suite of programs tailored to the needs and skills of arts-based students handling complex alphanumeric files.

3. GLASGOW ASSETS

A. Existing History Databases

Computers have helped to generate five large enduring databases at Glasgow.
(1) The Vatican Archive Project (Professor Ian Cowan - Scottish History) has
collected Scottish supplications from the thirteenth century to 1567. These
35.000 records contain an unrivalled wealth of information concerning
Scottsh social and political as well as ecclesiastical life.
(2) Nicholas Morgan (New Blood Lecturer in Modern Scottish History) manages
an ESRC funded project concerning property ownership in Victorian and Edwar-
dian Glasgow which is constructing a database drawn from the Valuation Rolls
for the city at selected benchmark years from 1861. There are records of
every separately rated residential property including the name and occupa-
tion of the property owner, the number of houses in each property, and
rental. Using programs developed in the University Archives it can be inter-
rogated on-line and easily linked to other social data.
(3) The four-year ESRC Scottish Business Biography project (Professors S.G.
Checkland and A. Slaven - Economic History) has generated biographical
information on hundreds of systematically selected Scottish businessmen
active since i860. This information contains structured data relating to
careers and social behaviour.
(4) The University Archives' Scottish Sequestration (personal bankruptcy)
database covers the period 1839 to 1913. Using programs which have been
developed in the Archives, it is possible to interrogate the database on-
line to locate individuals, places at county and town/village level, speci-
fic job descriptions, occupational groups at three levels, correlations
between these variables, and to count the specified output.
(5) A Project funded by the Twenty Seven Foundation on marriage patterns and
social structure 1837-1914 (Dr. R.H. Trainor - Economic History) has as-
sembled data on 14.000 marriages for the West Midlands, including informa-
tion on: frequency and seasonality; incidence of religious ceremonies; age,
civil condition and literacy of brides and grooms; and occupations of mar-
riage partners and their fathers.

B. Existing Hardware Provision in Participating Departments

Mainframe terminals installed or approved in individual
Departments   7

Micro-computers - departmental administration/word
processing/data preparation (UGC/externally funded)   **12**
Mainframe filestore for existing projects (megabytes)   **150**

4. PROJECTED DATA CAPTURE

The experience won in the history departments during the creation of the
established databases provides a springboard for extension and exploration.
It is intended to seek funds to interpret the Scottish Business Biography
database by correlation and comparison. The uniquely rich Scottish archives
relating to property ownership and investment will be used to enhance the
database drawn from the City of Glasgow Valuation Rolls. Exploratory data-
bases for Scottish confirmations (probates) are being created from the
printed Calendar of Confirmations of Executors, extant from 1876. There are
plans to link selected cases in the West Midlands Marriage database to the
census enumerators' books and probate calendars. In co-operation with the
Strathclyde Regional Archives educational adviser, trial sets of Poor Law

applications are also being held in machine readable format. More detailed information on the bankrupts will be collected to enhance the Scottish sequestration database. Funds are being sought to enter biographical data relating to undergraduates attending the University from 1859-1879 and to exploit systematically the unique collections of business records in the Adam Smith record store. From autumn 1985 the Wellcome Unit for the History of Medicine will create a number of machine readable databases, including biographical information on Scottish doctors and statistics relating to specific diseases, procedures, and institutions. Some of these developments will utilize the KDEM facility in the Computing Service.

5. TEACHING REQUIREMENTS

At present it is impossible to use the existing databases in undergraduate teaching because of inadequate hardware provision and, more importantly, because of the difficulties encountered in mastering operating systems and available applications packages. It is not yet feasible to download very large amounts of data from mainframe databases onto micro-computer networks supported by hard-disc systems, but a communications PAD connected to the mainframe serving a teaching lab with appropriate software would provide the means for exploiting the existing databases and selected subsets in the classroom. This process will be improved by the imminent installation of a separate high-speed campus network. The aim is to make the databases just as accessible as the printed word, in the process introducing students to the processes of data preparation, data handling, data management and informa- tion retrieval as they relate to the historical discipline.

Having gained access to otherwise unapproachable sources, students will be able to use the software generated by this proposal to develop the basic historical skills involved in evaluating evidence critically. There will be four stages in harnessing the computer to the development of these skills:

> (1) simple classroom illustrations;
>
> (2) supplementary assignments for students to carry out independently of the instructor;
>
> (3) the integration of output with text in the writing of essays;
>
> (4) for those who have profited most from the exercise - more extended applications in dissertation work.

At a later stage in the project it is anticipated that students could use small self-generated databases in steps (3) and (4).

6. SUBJECT AREA PROPOSALS IN HISTORY

While many students read for an honours History degree in more than one of the major subject areas, the actual teaching is carried on within individual departments where the substantive applications of computers to undergraduate courses will appear. Although many staff are interested in exploiting this resource in their teaching, as an experiment three courses have been desig- nated to implement and assess the project. These have been chosen to compare the teaching potential of our own databases (1 and 3) and one acquired from elsewhere (2).

Designated History Courses

A) Elites in Nineteenth Century British Society (Dr. R.H. Trainor - Econo-
mic History) supplementing current analysis of census and probate infor-
mation with use of the West Midlands Marriage database to examine (with
special reference to the middle class) social customs, social mobility,
and interaction among social and occupational groups.

B) The United States 1776-1876 (Dr. B.W. Collins - Modern History) using
demographic and social data from the censuses of 1850 and i860, corre-
lated with county - level election returns for state, congressional,
gubernatorial and presidential elections in the i85o's, data drawn from
the University of Michigan Consortium of Political Science Research
(available in the ESRC data archive at the University of Essex).

C) Approaches to Scottish History 1851-1921 (N.J. Morgan - Scottish Histo-
ry) a thematic and critical introduction to the sources, qualitative and
quantitative, available for the study of Modern Scottish History. Sour-
ces used will include the Valuation Roll database, the Calendar of
Confirmations, Poor Law applications and the Sequestration database.

7. DEVELOPING THE COMPUTER ENVIRONMENT IN HISTORY

A) Hardware and Communications

Past experience suggests that the databases already available or under
construction will have an average size of around 15 MB. They will be stored
on the University mainframe computer, and access will be via a teaching
laboratory comprising sixteen micro-computers and fileserver linked to the
mainframe through a communications PAD in the Arts precinct. A site will be
chosen convenient for students in all participating departments. These
facilities would support the average size of the designated classes. Many of
the large scale correlations and comparisons which are envisaged exceed the
capacity of a micro-computer, even with hard disc support. However, a major
dependence on the mainframe computer would be expensive, particularly in the
case of larger classes. For specific course purposes, it is therefore plan-
ned to down-load well defined subsets of the main databases onto the micro-
computers functioning as a local area network through the fileserver. In
stand-alone or network mode, the micro-computers will also permit the com-
pletion of simple tasks and classroom demonstrations.

The link to the mainframe through a communications PAD would allow direct
access to other databases, such as Edinburgh University's 1851 census data-
base, via the Joint Academic Network. As one of our objectives is to exchan-
ge and analyse data from other universities, particularly the Edinburgh
University project, it is imperative that the eventual choice of hardware
(currently under evaluation) offers some degree of compatability, and fol-
lows the guidelines laid down in the Whitfield annexe to the Nelson report.

B) Software

The software applied or developed by the project should bring students into
contact with sophisticated sets of computerized data, thereby enhancing
their historical skills. The choice of operating system to be used will be
determined by the hardware employed and will reflect project requirements.
Students should be able to access and scan files with ease and submit
complex search, correlative and quantitative requests by means of a friendly

user interface. Graphic display facilities, possibly incorporating colour, will also be required.

Database and statistical/economic analysis software are well defined areas for which standard packages and specially written software have been available on most university mainframe computers for at least a decade. However, the current difficulty is that all the available systems provide either sophisticated data handling and extraction facilities with rudimentary analysis, or sophisticated analysis facilities with rudimentary data handling. There is a need to extract and analyse data within one package, using one interface. As far as possible this mainframe interface should be identical with that on the micro-computers. This will facilitate comparisons of jobs run against both database subsets and the main databases. A further problem is that current interfaces to both database and analysis software are usually, at best, similar syntactically to the programming languages of ten years ago. These effectively require students to learn to progam. There is work being done in 'natural' language interfaces, but any integration of such development into standard software will probably take at least another decade. In addition, most current packages are oriented towards statistics or scientific disciplines requiring a level of computing knowledge which cannot be gained speedily by arts-based students. Furthermore, the use of the mainframe computer requires a knowledge of a complex operating system, far less friendly than the software packages being invoked. A solution lies in recent developments on micro-computers, including non-linguistic methods of access, such as icons, mice and touch-sensitive screens. Used in conjunction with tailored software, these should provide a medium which will allow staff and students to concentrate on the historical aspects of their computer-related studies. Where it is deemed necessary to create new software the programmer/analyst will give high priority to considerations of transferability and portability, consulting where appropriate with other tertiary institutions.

C) Training and Support

The Computing Service is committed to the general concept of the project and will be responsible for technical supervision and support through Peter Barry, head of the Distributed Facilities Division, and David Fildes, head of the Applications Software Division. In addition Professor M.P. Atkinson and colleagues in the Computing Science department engaged in database research will be involved in devising introductory training for staff and students. This will be the first stage of an academic staff development programme within the Faculty of Arts.

8. PROJECT MANAGEMENT

The core project will be directed by Dr. R.H. Trainor consulting with a management committee representing the participating departments - Modern History, Scottish History, Economic History, the University Archives, the Wellcome Unit for the History of Medicine - the Computing Service and the Faculty of Arts. The project staff will report to this committee which in turn will report through Dr. Trainor to the Computer Board as required. This management committee, liaising with the Faculty of Arts Computer Applications Committee, will control the Computing Facility which will be under the technical supervision of the Computing Service.

9. IMPLICATIONS FOR FUTURE DEVELOPMENT IN ARTS BASED TEACHING

This project, in addition to its utility for the development of computer applications for tertiary level teaching in history throughout the United Kingdom, will contribute to the extension of such initiatives in arts-based teaching at Glasgow. It will be of direct benefit in three ways:

A. Computing Environment

The teaching laboratory will provide a major teaching resource for the Faculty, both for the duration of the core project and subsequently. Priority will be given to the designated classes within the core project although approximately fifteen hours of lab time will be available weekly for the development of other selected courses. Staff pursuing these initiatives will be encouraged to join the training programme offered to history staff by the programmer/analyst.

B. Complementary Teaching

The creation and implementation of software for history teaching will complement other current developments. Among these are studies in digital audio signal processing in the Music department, mathematical applications in Archaeology, and CAL teaching programmes in logic and grammar in a Logic, Language and Communication course to be developed in the departments of Philosophy and English Language. There are also CAL teaching initiatives in the Psychology department and the Language Centre, in the latter case involving the development of a fully intgrated, computer-based audio laboratory.

C. Areas for Future Development

There are a number of databases now being created which could be exploited for undergraduate teaching by adapting software created and expertise won at the end of the three-year project. These include the Historical Thesaurus and its associated project in the department of English Language, data generated by the Biographies Research Unit in the department of English Literature, and site data in the department of Archaeology.