THE PHOENIX DATABASE

Abstract

The database is currently a greatly underestimated and under-utilised educational ICT resource. Database enquiry work can stimulate a comprehensive variety of educational activity and can accommodate the widely differing abilities, learning styles and literacy competences pupils present. Set as the cornerstone of problem solving, fresh life is breathed into apparently dull subject matter and genuinely deep learning is stimulated.

Ironically, education has had access to this rich learning resource for many years but has made indifferent use of it. In the 1980s such databases were used in primary and secondary classrooms to illustrate “people in the past” but these early programs were limited in the file size file they could accommodate, by their totally text-based nature and by the intricacies of the interrogation facilities.

In schools, early enthusiasm for databases evaporated, but social change has seen public interest in using ICT (particularly for genealogical research) burgeon. As millions access the Internet data using powerful, easy-to-use search tools rich, visual databases are widely used. This paper proposes a resurgence of database activity in education to accommodate the “new” learner and facilitate the mastery of new digital literacies.

The database – a versatile and valuable ICT resource for education

A simple ICT resource which can trigger, in our classrooms, the development of a comprehensive range of educationally valuable graphs, maps, descriptive prose, functional report writing, PowerPoint presentations, videos, photographic displays, Wordle pictures, original art, oral accounts (including podcasts) and multimedia productions must surely be one of the most sought after resources in education. When such a resource is capable of stimulating pupil investigation (individual, paired or group), genuine research and extensive follow-up activities in the upper classes of Primary schools and similarly engaging the attention of secondary pupils then it would appear to be an exceptionally useful component in the teaching and learning arsenal. Add to this heady mix the potential to promote the development of literacy skills – even to acquire and enhance many of the new competencies advanced for digital literacy (Carrington and Robinson, 2009) on behalf of the current crop of digital natives in our classrooms – and to accommodate varied learning styles and target diverse pupil abilities then it is obvious this is an incredibly valuable resource.

All of the above developments can be realised from the study and interrogation of a database. It may be a database from any subject area but let us consider, for example, a simple population census database and how it might support understanding in History. This is a widely available resource format in many countries. In the UK there is total population census coverage with information recorded on all inhabitants every decade from 1841. This rich repository initially only looked at very simple social features of the population – an individual’s forename and surname, their age and sex, the occupation they engaged in, their county of birth and the place where they currently lived. Each decade further categories of socio-economic information were added, making the database an increasingly sophisticated resource. By 1861 the census fields also recorded the relationship of people in the household (head of household, son, daughter, lodger etc.), their status (married, widowed or unmarried), their specific age, a more detailed occupation, their actual birthplace (in addition to their county of birth), information on the languages they spoke fluently, whether they were blind, deaf, dumb or even considered an imbecile and the number of rooms in the house which had windows (a clear indicator of wealth or socio-economic class). In paper (or microfiche) format this is a fascinating though daunting resource – not one geared to rapid exploration or analysis – and while eyeballing might quickly identify a relationship this is more likely to surface after hours of painstaking examination of the data.

In electronic format and with ICT tools this resource is transformed. With even a small file, perhaps of 600-800 individuals, pupils have at their fingertips the encapsulation of the social, and much of the
economic, life of a village or a clearly defined small residential or commercial area within a city – a busy thoroughfare or a wealthy enclave. Where the file is larger – say 2000 to 3000 individuals – then they can investigate the entirety of a small town such as a coastal port or fishing centre, a rural market town or tourist trap or a small industrial centre located within a major town or city. All these files are suitable for classroom use and their investigation can help pupils, almost instantly, to identify major social and economic characteristics of the settlement and its people. A range of supporting resources can be woven into the research activity to support and enhance the investigation. The following example considers what activities may be stimulated and what conclusions may be drawn from an investigation of the 1851 population census for the small rural parish of Deskford in the North East of Scotland – just 921 inhabitants.

Exploring and explaining the past – an exemplar

Age-sex pyramids are combined representations of the male and female population age graphs – with the age limits usually represented every five years. Once the ages are recorded (an extremely simple adding-up procedure) and banded the resultant graph/diagram illustrates the structure of the population. Pupils can describe and try to account for this broad structure. They might usefully be guided to focus first on the categories showing the younger or older segments of the population and then any differences in the male-female balance or the groups likely to be working or at school. All the time they should be encouraged to set up hypotheses they might test and try to explain. Awareness of the location of the population centre and the main employment types (information gained from other class groups) would help support hypothesis testing. Another group of pupils might investigate household/family size and report on their findings. One of the interesting features in rural settlements like Deskford at that time relates to farm labourers being employed by and living in rough accommodation on their “work farm” rather than living in their family home. There are many examples of greatly extended families and of boarders/losdgers in the households.

Pupils could be involved in a paired exercise where they are asked to investigate specific families or households and produce potted biographies which describe and explain the structure and the relationships within the household, the employment activities different family members are engaged in and surmise at their living conditions (Hillis, 2009).

Consider the very different tales the pupils might produce from the bare records in the database for the inhabitants of Aikenhillock:

<table>
<thead>
<tr>
<th>Name</th>
<th>Relationship</th>
<th>Marital Status</th>
<th>Age</th>
<th>Occupation</th>
<th>Place of Birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ann Deeson</td>
<td>Head</td>
<td>Widow</td>
<td>82</td>
<td></td>
<td>Born Deskford</td>
</tr>
<tr>
<td>Margaret Clark</td>
<td>Daughter</td>
<td>Unmarried</td>
<td>46</td>
<td>Pauper</td>
<td>Born Deskford</td>
</tr>
</tbody>
</table>

Compared to the inhabitants at nearby Burns (a 150 acre farm):

<table>
<thead>
<tr>
<th>Name</th>
<th>Relationship</th>
<th>Marital Status</th>
<th>Age</th>
<th>Occupation</th>
<th>Place of Birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexander Smith</td>
<td>Head</td>
<td>Married</td>
<td>57</td>
<td>Farmer</td>
<td>Born Deskford</td>
</tr>
<tr>
<td>Margret Smith</td>
<td>Wife</td>
<td>Married</td>
<td>41</td>
<td></td>
<td>Born Deskford</td>
</tr>
<tr>
<td>Hellen Smith</td>
<td>Daughter</td>
<td>Unmarried</td>
<td>20</td>
<td></td>
<td>Born Deskford</td>
</tr>
<tr>
<td>John Smith</td>
<td>Son</td>
<td>Unmarried</td>
<td>15</td>
<td>Scholar</td>
<td>Born Deskford</td>
</tr>
<tr>
<td>George Smith</td>
<td>Son</td>
<td>Unmarried</td>
<td>7</td>
<td>Scholar</td>
<td>Born Deskford</td>
</tr>
<tr>
<td>Francis Smith</td>
<td>Son</td>
<td>Unmarried</td>
<td>5</td>
<td>Scholar</td>
<td>Born Deskford</td>
</tr>
<tr>
<td>Gardiner Smith</td>
<td>Son</td>
<td>Unmarried</td>
<td>3</td>
<td>At home</td>
<td>Born Deskford</td>
</tr>
<tr>
<td>Peter Smith</td>
<td>Son</td>
<td>Unmarried</td>
<td>7m</td>
<td>At home</td>
<td>Born Deskford</td>
</tr>
<tr>
<td>Margret Allan</td>
<td>Servant</td>
<td>Unmarried</td>
<td>30</td>
<td>House Servant</td>
<td>Born Fordyce</td>
</tr>
</tbody>
</table>
There is obvious scope for the teacher to push pupils to address questions such as - What would the quality of life be like in both houses? What do you notice about the birthplaces of the servants? What sizes might the two dwelling houses have been and how many rooms might they have had? What would the respective daughters Margaret Clark and Hellen Smith do all day? Was this a small or a large farm? An apparently elementary investigative exercise is rich in possibilities for stimulating pupil enquiry skills and developing understanding.

On a more extensive scale another group of pupils might similarly examine the information on the four households comprising the tiny hamlet of Squaredoch. On a 44 acre farm lived the eight members of the extended McHattie family (ages ranging from 74 to a one month old grandson) together with two, twelve year-old farm servants. On census night they entertained a 70 year-old visitor (a pauper named John Rutherford). Next door to the McHatties were the Reids, six of them. Mr. Reid was a master shoemaker and there were three young journeymen shoemakers in the house. Also in Squaredoch there were two single occupancy dwellings – one occupied by Jane Coull (an 81 year-old annuitant widow) and the other by 76 year-old Elizabeth Rutherford – an unmarried grocer.

Once again, analysis of this small hamlet offers many opportunities for literacy development and interesting issues/questions to address - What was an Annuitant and was that really a job for an 81 year old? Why had the grocer not retired and where might her shop premises have been? What was the difference between a master and a journeyman shoemaker? What would life be like in the different houses? Why were Janet and Isabel Reid not at school? Why was James Garden working as a journeyman shoemaker at the tender age of 13 and Jean Gorden as a farm servant at 12 – should they not have been in school? What was a pauper and why couldn’t he get work? Was he any relation to the lady grocer (same name and about the same age) and, if so, why wasn’t he staying with her?

All of the pupil-generated biographies – with family sizes and potential information sources matched to pupil ability can be agglomerated to offer an insightful description of the village.

Even consideration of the forenames of the parish residents offers a vehicle for explorative activity. The list reveals interesting patterns and can be further compared and contrasted with common names today. The 1851 list was quite restricted or limited with Alexander (62), Ann (69), Elizabeth (24 plus 8 Bettrys), George (63), Helen or Hellen (32), Isabella (48), James (88), Jane (33), Janet (42), John (72), Margaret (77), Mary (31) and William (67) accounting for over 80% of the population of the parish! This limited list accords closely with the 1855 registration data for Scotland (General Register Office, 2009). There were also some interesting and different names such as Abercrombie, Amelia, Bathia, Elsy, Elspit, Hector, Lilas, Sophia and Walter but no mention of modern popular names like Kylie, Lewis, Jack, Ryan, Ronan, Emma, Amy, Linzi or Chardonnay! Pupils could follow up information on modern names on the General Register Office website where, of all the 1851 main names, only James retains a Scottish top ten placing. Nobody, but nobody, is called Margaret any more! The names can be displayed here were also some interesting and different names such as Abercrombie, Amelia, Bathia, Elsy, Elspit, Hector, Lilas, Sophia and Walter but no mention of modern popular names like Kylie, Lewis, Jack, Ryan, Ronan, Emma, Amy, Linzi or Chardonnay! Pupils could follow up information on modern names on the General Register Office website where, of all the 1851 main names, only James retains a Scottish top ten placing. Nobody, but nobody, is called Margaret any more! The names can be displayed more effectively using Wordle and the comprehensive output possibilities of this web application add a new and highly interesting dimension to the aspect of effective communication. The forename exercise can stimulate considerable discussion (not least on how they distinguished between the 88 males known as James or the 77 females named Margaret) and activity/exploration of social change. Another group of pupils could carry out an equally rewarding analysis of surnames – identifying possible family links and unique regional names.

Wordle was useful, as were simple bar graphs and tables, for presenting employment categories/types and totals in the parish. In this rural area the employment structure was comprehensive yet diversified with many trades represented – particularly those typical of rural or agricultural areas. Male employment included farmers (with crofters, farm/agricultural labourers and cattle-herders), shoemakers, tailors, grocers, millers, blacksmiths, cooper (barrel makers), joiners/carpenters, masons,
weavers and spinners (of both wool and flax). There were many female farm servants, housekeepers, domestic servants and dairymaids plus dressmakers, teachers and even a stocking knitter. A number of elderly ladies were listed as annuittants or fund holders (ladies of independent means) but at the other end of the scale there were numerous paupers (dependent on community benefits and perhaps accommodation in the local poor house). There was also the odd errand boy, a Chelsea Pensioner, a bread seller and a slater. As with the personal names exercise there is tremendous scope for exploring the employment picture in detail and comparing it with that of today. Some of occupations/trades pupils might think it strange to find in a small rural area – the tailor or the shoemaker certainly wouldn’t feature today but they were locally essential in the pre-mass production age. Similarly, the age of many employees was much lower than that of today – in the area in 1841 children as young as six years old were working as farm servants or herd boys. Today occupations like weavers, spinners, dairymaids, and stocking knitters are thin on the ground! Deeper analysis of the Farmer/Crofter category offers a detailed picture of farming in the parish as the size of farms and their employment totals could be explored – 75 individual farms ranging from 2 to 160 acres in size (with an average size just less than 40 acres) providing additional employment for 112 labourers of all types. This is a task for a more able group.

A final area of exploration from the basic database concerns the place of birth of the different individuals. For a date such as 1851 the expectation would be that the population was not very mobile. Indeed it would be expected that people would move from rural birthplaces to larger urban centres in search of better-paid employment. Therefore identification of people resident in Deskford in 1851 but not born there could be measured against information on employment or age to gauge the level of mobility and pupils might try to identify whether people were moving just from neighbouring parishes or from further afield, and what socio-economic, employment types or age groups were moving into the parish.

All of these investigations – of age-sex structure, of family size and organisation, of characteristic forenames and surnames, of relationships in specific households, of employment types and of population movement can all be carried out directly from the database. The pedagogical trick is to match up the different tasks to specific groups, pairs or even individual pupils so that they can carry out a task which is both within their ability/compass and suits or matches their specific learning style. This is where and when the teacher has to exercise their professional judgement and knowledge of pupil skills and abilities to effectively personalise pupil learning. The tasks should afford pupils the possibility of communicating their conclusions to the rest of the class, not necessarily using ICT resources, but, where they can be used advantageously, there would be a bonus. Pupils should have the opportunity to extend their literacy skills through report writing or creative/descriptive writing and further enhance these skills by reporting orally and listening attentively to presentations from other groups. Again the teacher must assume responsibility for creating a classroom environment where different contributions are valued and should always seek to develop understanding. In this way the aggregated exercises and their results fuse together to provide an extremely detailed picture of life in Deskford parish in the mid-nineteenth century.

**Extending and enhancing the findings**

When the database is presented as the cornerstone of problem solving activity geared to the exploration and explanation of reasoned hypotheses, the identification of trends, relationships and even spatial patterns, then life is breathed into apparently dull subject matter and genuinely deep learning and understanding can result. In this way ICT can contribute to the transformation of education or teaching and learning – rather than simply supporting it. Additional support can come from other resources, particularly digital resources accessible through the Internet. Web research can quickly identify old maps of different scales, provide textual descriptions of the area – its landscape, its agriculture and social activity (from Statistical Accounts) and information on local attractions.

Where earlier population census databases exist then time series maps and graphs can be generated to show how the size and structure of the village changed over time, how employment changed, how dependency on the land varied (and how farm size grew) and how population immigration and emigration took place. Indeed, for Deskford it was possible to quickly access additional population
census data for 1841, 1861 and 1881. All of this activity (and more described below) fosters more hypothesis formulation, more hypothesis testing and deeper understanding of socio-economic change and development. It also boosts literacy skills and offers more varied communication methods – text or graphics-based reports, e-mails, blogs, video stories. Pupils could even twitter or tweet to their classmates or friends. Each different method helps pupils with particular learning styles to participate more effectively and, most importantly, benefit intellectually from the learning process.

What I have described so far is the rich variety of classroom activity that study of a simple database can stimulate. Patently the database can be the powerhouse of a more extensive “topic study” where it is the key to opening up a comprehensive study of the Victorians, manufacturing industry, farming or immigration (Hillis, 2005).

Educational indifference killed the database

Ironically, despite the tremendous potential for teaching and learning inherent in database work and despite the fact that educationally-oriented databases have been available for some twenty-five years, education generally and teachers specifically (even teachers of history) make minimal use of this invaluable resource in classrooms today. During the nineteen eighties the picture was very different. In many of the UK’s primary and secondary school classrooms databases, especially but not exclusively population census databases, were used to illustrate snapshots of the life of “people in the past” – inhabitants of rural villages, small industrial centres, poor houses, prisons, court cases and even participants in battles such as soldiers comprising the Atholl Brigade at Culloden in 1746. One database used extensively in both the UK and Australia was that of The First Fleet (University of Woolongong, 1999) with its rich dataset of convicts sent to the “Colonies” from the UK. Many had committed quite minor crimes but it was then convenient to get rid of them to the other side of the world.

Unfortunately many early exemplars were rather limited in terms of the file size which could be accommodated on early computers and were of limited investigative potential. Many were of specific villages or parts of a limited set of towns of limited interest to anyone apart from their present day inhabitants or if the focus of the information they contained was genuinely “national”. Many therefore lacked appeal and applicability. Had teachers wanted to create their own local file for classroom use accessing the information was difficult and creating a useable file was extremely time consuming. At one stage I calculated it could average about five minutes to source and input each record – so for Deskford 1851 you could expect to spend 60 hours creating the file. This was a formidable commitment for teachers so most of the files made available for use came from Local or National Working Parties of teachers, often underwritten by Government. A final factor inhibiting the use of the early database was the interface. This allowed users to construct meaningful searches of the data. Usually this was couched in complex, convoluted language, often employing Boolean logic, which many non-computerate teachers found difficult to fathom out and their pupils found incredibly uninteresting and uninspiring. Database enquiry rapidly soared and then, as the enormity of the constraints became apparent, plummeted out of use. Teachers were encouraged to look to the Internet to supply information and stimulate research.

Resurrection through public interest

Surprisingly, once the use of databases for historical enquiry waned in schools the general public’s social interest in the computer and genealogy gathered pace. Today, for millions of citizens around the globe, this is a prime use of ICT no matter the age or digital ability of the user! In many countries – certainly the UK, Australia, the Netherlands, Canada and the USA - there are state maintained libraries of computer databases ranging over population censuses; births, marriages and deaths; church baptism records; transportation manifests; immigration centre records; military records; industrial organisations employee and production data; wills/probate sources, even graveyard and war memorial transcriptions. All can help individuals to identify and track down the life-paths of relatives or to build up their family tree. Software is available to help, organisations offer search facilities and, in some cases, television programmes probe the past of celebrities and excite viewers to attempt less ambitious
research on their own families. This burst of enquiry has led to the growth of message boards posting details of or requests for details of thousands of individuals all over the globe. The message boards offer yet another source where snippets of information can embellish the results of classroom enquiry – for example details on Deskford inhabitants in and between the censuses. From myriad sources – census population databases, old maps, farming diaries and journals, innumerable message boards, war memorial details, special papers such as a report on lime workings in the area, gravestone inscriptions (Moray Library Services, 2009), school log-books, Google Earth and many associated pictures on Flikr or accessed through Geograph (which currently offers 1299 images of the area within 10 kilometres of Deskford centre) the parish of Deskford can be brought to life and the features of life in the parish over 150 years ago assume a sharper and more comprehensible perspective.

The Phoenix is risen – nurturing the potential

Twenty-five years on, I propose the educational potential of the computer database for the teaching and learning associated with history has never been greater and never more easily realisable. Computerisation has led to widespread availability of a raft of population census databases. These can be searched or queried in a most user-friendly fashion, often deploying simple custom-designed interfaces. The information revealed by these searches can be presented in manifold ways, as graphs, diagrams, maps, PowerPoint slides, Wordle pictures or form the basis for blogs, wikis, twiterting, word documents, integrated multimedia reports, podcasts or videos. The information from any simple database can be supported, enhanced and embellished by textual, diagrammatic and photographic evidence widely available on the Internet and together with time-series data sources can help users create spatial distribution maps to further assist understanding of observed trends, relationships and patterns.

This applicability is not just confined to the history classroom. In geography there are extensive files of climatic data, of agricultural statistics (for the EU, US states or the provinces of Japan), of global socio-economic indicators (how simple today to identify the North-South divide, rich world poor world or even polluting nations and their carbon footprints) and many GIS remain untouched. There are similar opportunities in Chemistry (even the Atomic Table is updated and visual), Biology (whatever happened to Ecodice?), Languages, Art (where Picasso’s Guernica was a model for picture analysis) and Music (Beethoven was once analysed using a HyperCard stack and there are databases for most periods/types of Music – even “chart hits”).

Given all this potential I consider it would be criminal if databases were to remain in limbo – seldom utilised to enhance the education of young people – especially when many of their family members make extensive use of ICT and databases out of school. This is yet another area where the ICT experiences offered in school are at variance with those on offer (and keenly desired) in the out-of-school world. The resource is widely available, much supporting data can be added to support the central information and a visual element is easy to incorporate. The tasks teachers can develop and the skills they can promote through database activity can directly help learners with different learning styles, of varying intellectual abilities and with widely different attention spans. Tasks can be custom-developed and specific skills can be tightly targeted. Understanding can be established and enhanced. The time is right to capitalise on the database and allow it to rise like a phoenix in classrooms. It can accommodate the twenty-first century or new learner. It can foster all aspects of literacy. It can engage the digital native pupil if cleverly used by the digital immigrant teacher. Above all, it can facilitate understanding and can support the development of the digital literacies considered so desirable and essential to, and by, our young people.

References


