Making History Relevant through the Provision of Education, Stories and Interactive Experiences

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Abstract: What makes the history of something real and relevant to people? In this paper we suggest that people find artefacts and ideas more relevant when they can see where they fit into their own world – how they relate to their own society. The world has entered a time when Information and Communication Technologies (ICT) are becoming increasingly embedded in the way we live. ICT has become something we just take for granted. On the other hand, its history is often not seen as relevant. The mature ubiquity of ICT points to the importance of understanding its story. The history of computing should be presented in a way that opens the pathway to understanding the future. In this paper we examine some of the issues of presenting such an historical perspective, through the provision of education, stories and interactive experiences.

Keywords: History, computing, museums, exhibits, mainframes, dinosaurs, steam trains, real, relevant, education, experiences

1 Introduction

'What is Real?' is a question addressed of one toy by another in the children's book: 'The Velveteen Rabbit'.

> *"What is REAL?" asked the Velveteen Rabbit one day, when they were lying side by side near the nursery fender, before Nana came to tidy the room. "Does it mean having things that buzz inside you and a stick-out handle?" [1 :14]*

When we encounter something new we often ask ourselves if it is 'real', by which we mean is it something that is relevant to us? Is it important enough to us to find out more about it and to get involved with it? In this paper we will address the question of what can make the history of computing relevant, or real, to people. 'Is it a real?' or 'Is it relevant?' tend to be questions asked by humans of artefacts such as old computers in an attempt to decide how seriously to take them; to decide whether they are worth further investigation and could possibly be of some interest to them [2].

Fig 1: 'Velveteen Rabbit'

People only find out about something when they have some reason to do so or want to learn more about it. Some people are naturally interested in a given topic but others are not and need to be introduced to it. This has implications for the presentation of history. A person with no prior interest is unlikely to suddenly become interested. The old saying: *You can lead a horse to water, but you cannot make it drink* comes to mind. It is difficult to understand something that is outside your experience and First Generation mainframe computers are completely outside the experience of most people. Those who have lived through the computer generations certainly have experience of the history of computing, and this history is very real and relevant to them. On the other hand, anyone brought up to see a computer as a box, keyboard and screen on your desk finds mainframes completely foreign – 'are they computers?' Sixty years ago, to use a computer you needed to have a good understanding of what was going on inside it. Even thirty years ago it was desirable to have some idea of how a computer worked, but today this is not the case and so speaking about the memory, storage space or operations per second of these old machines does not necessarily mean much to most people.

Although old mainframe computers are outside the experience of most people, this is also true of dinosaurs and steam trains and almost all children find them interesting and can tell you quite a lot about them. What is the difference? Why is the history of dinosaurs innately interesting to many people but the history of computing not so? In this paper we will argue that for those who have not lived through the history of modern computing as a participant and so do not find this a fascinating topic, it is necessary to find something to attract or interest them. We suggest that this can be achieved through the provision of a combination of education, storytelling and interactive experiences related to computing to make history real and relevant to them. Sometimes, however, the history of technology makes little mention of computers where it could do so. Films and books about Enigma have made Bletchley Park and cryptology relevant to many people, but the re-built Colossus is hardly ever mentioned.

One way people can gain interest is to have learned, or been taught something about the history of computing, or to have watched a relevant film or video – to have received some education on this topic. Another way to experience this history is through simulations and interacting with re-builds of technological artefacts, but this does not necessarily mean much to most people unless they can see where it all fits in with their lives. For this, education is necessary to introduce cultural relevance to viewing the history. When looking at the display of a 1950s mainframe, for example, we can ask questions such as:

- 'Who were the people who built it?'
- 'For what purpose did they build it?'
- 'Did it follow from what was learned in earlier inventions?'
- 'Where did this lead to?'
- 'What difference did it make to lives of people at the time?' and
- 'How has it led to today's technology?'

These questions can then pave the way to putting this history into a cultural context and making it culturally relevant. Providing some of the background about the inventors, technicians, programmers and users would help here.

2 How the History of Other Topics is Made Relevant

It may be possible to use methods and approaches from other historical areas and cultures to suggest ways of improving interest in computing history. In this section a few examples are examined.

2.1 American History

Their history is relevant to most Americans partly due to a number of national holidays representing real events in American history: Columbus Day (remembers Christopher Columbus' arrival to the Americas on October 12, 1492), Martin Luther King Day (celebrates the life and achievements of an influential American civil rights leader), Independence Day (commemorating the adoption of the Declaration of Independence on July 4, 1776), Presidents' Day (Washington's Birthday, Feb 18), Memorial Day (commemorates all men and women, who have died in military service for the US) and Veterans Day (November 11). US children also are taught a lot about their past Presidents (and can probably recite the list), their origins, their history, their independence, the civil war and about many other aspects of their country. Their history has been made very real and relevant to them because of formal education and of listening to interesting stories as well as being able to visit historic sites and make use of interactive displays and simulation games. This is in addition to their being reminded of this history by the names of US public holidays.

Fig 2: USS Constitution

2.2 Dinosaurs

To many children, Palaeontology (the scientific study of prehistoric life) is real and relevant because of the romance of the dinosaur. The film 'Jurassic Park' was a good start and David Attenborough's 'Walking with Dinosaurs' TV program and exhibition did much to popularise the dinosaur. Watching children move through the Walking with Dinosaurs exhibition and observing the model dinosaurs moving, the relevant of dinosaurs to them can readily be seen. Added to this the sheer size of dinosaur skeleton bones, like the one in the entrance to the Natural History Museum in London, make it hard not to develop some interest. Many children have also been given a dinosaur toy at some stage or have seen the Flintstones or Dorothy the Dinosaur on television. For children, dinosaurs

Fig 3: Dinosaur skeleton in a museum

have become very real and relevant mainly through storytelling. In many cases this interest remains through life.

2.4 Machines

At Museum Victoria in the 1950s and 1960s there was a gallery with lots of model mechanical devices that could be operated by pressing a button. These devices included mining machinery, farm machinery, factory machinery and various types of mechanical engines. The first thing that most children (especially boys) wanted to do when they went to the museum was to visit this gallery and start pressing buttons. Whether they learned much about the devices themselves from this, or just enjoyed pressing buttons to make them work is an open question. These machines became very real and relevant though offering the children an interactive experience.

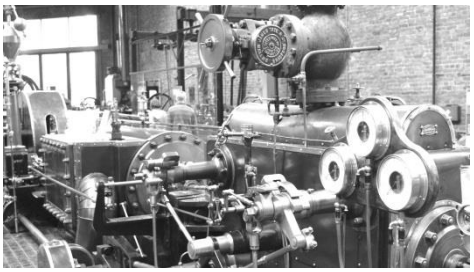

Fig 4: Machine in a museum

2.5 Steam Engines and Vintage Cars

Although there are few places in the world where steam trains still operate there is a certain romance about them that many people find attractive and interesting. They find displays and even trips in these stream trains act to make them very relevant. This relevance is due mainly to the provision of an interesting experience but perhaps also to their size and to the noise and steam they emit. Likewise displays and processions of vintage cars have a natural romance that many people find attractive and that make these machines something that is relevant to them.

Fig 5: Puffing Billy, Melbourne

3 Museums and Computers

The purpose of collecting computing artefacts in a museum can be for all or for some of the following:

- for their preservation
- for research purposes and
- for display to the public to encourage an understanding of the place played by this technology in leading to the ICT of today.

Kreps [3] notes that museum curators are now responsible for researching, interpreting and presenting collections that can be displayed in exhibitions and in publications as well as other media. Not all museums see their role in covering each of these areas. In the late 1980s the Museum of Vertebrate Zoology at the University of California, Berkeley, for instance considered their role to be in scientific research and not in public instruction with a sign at the front door stating: 'NO PUBLIC EXHIBITS' [4]. In relation to museum displays, Cameron [5] argues that "*Many visitors still long for a tangible, factual and validated scholarly narrative they can rely on*" but also for a range of differing opinions. It has also been argued that the museum collection is "*vital to the understanding of heritage*" [6]. There seems to be a general consensus that an important role of museums is vested in the displays of artefacts around which visitors can build on their previous experience.

We would argue that to make the history of computing relevant, significant artefacts should be on display with the purpose of facilitating learning, but not just formal learning through lectures, books and notes but also by discovery learning. Visitors to displays bring their own "historical experience, knowledge and beliefs" [7] and there is little likelihood of complete audience control in a display. An interesting idea is that of "chances" afforded by the display of artefacts. In education it is often the creation of an opportunity for students to discover a concept that has the most impact on the student. In the museum context the idea of creating "chances" has been postulated to have the characteristics of:

> *"Chances should not be explicitly displayed to users. However, such chances should rather easily be discovered and arranged according to the user's interests and situations. There should be a certain freedom for user to arrange chances."* [8]

The convergence of the idea of chances and discovery learning comes from the intrinsic detail of a real artefact. Real artefacts contain so much detail that it allows for a wide variety of visitor experience [9]. One visitor can see the teeth of the dinosaur and be amazed when comparing this to the baby tooth she just lost, the next can see the punch-card used to make music and compare it with the guitar strings they learnt to use that afternoon. The details of a real artefact matter when people attempt to make the connections that embody meaning. Moser expresses this as follows:

> *"Displays create new worlds for objects to inhabit and these worlds are full of ''devilish details'' that really matter when it comes to creating a system of meaning relating to the subject being represented." [10]*

4 Streams in Computing History

To think, as many people do, that computing began with the machines built in the 1940s is clearly erroneous as the history of computing goes back much further than this and can be traced back to earlier technologies that performed (although perhaps much more slowly) many of the tasks now performed by computers. In the popular imagination, however, the computer's ancestry is often related only to the history of calculating machines, but this is just one strand in the history of technology leading to what we now call a computer. We will argue that to concentrates only on this is to do

an injustice to the history of computing. Tatnall [11] suggests that developments in four broad sets of technologies, often overlapping, paved the way for the development of today's ICT.

4.1 Technologies to Aid Calculation

We have needed to perform calculations since time immemorial and especially since people began trading with each other. Two types of calculation had to be handled: one involved counting and the other measuring, as people needed to count livestock and measure cloth. Following the calculating devices that nature provided: figures for counting and the forearm for measuring, a whole range of mechanical, and later electrical and electronic machines were developed to aid us to perform calculations, leading to the use of today's supercomputers.

4.2 Technologies for Automation and Control

One of the things that distinguish us from other animals is the use of tools. Humans are not especially good at any particular physical task but we can think creatively and so produce machines to assist us [12]. Apart from the power and action aspects of mechanisation, control is of great importance and it is this that forms part of the history of computing. Techniques for control are based on programming in all its forms from mechanical sequencing to the machine code operation of early computers, programming of more recent computers and to use of integrated circuit technologies in automatic machines.

4.3 Technologies for Information Processing and Information Management

Information arises out of human actions [12] and non-human things become information only after a human has interpreted them. An important consideration is how people generated information as part of the process of building up a complex social structure and the technologies they used to assist in doing this from library records and collections to computer databases.

4.4 Communication Technologies

Communication, probably beginning with sign language, is another of the attributes that characterise humans. Communication involves passing some form of message from one person to another. The communications technologies that have been used over the years include use of symbols, cave paintings, petro glyphs, writing, paintings, photography, radio, semaphore, telephone, telegraph, newspapers, television and the Internet. This progression is an important aspect of the history of computing. But communication could also be seen in the result of many interactive human activities such going to the theatre or playing a card game.

4.5 Other Cross-Stream Influences

In addition to these four steams, other influences on the history of computing cross each stream, in many cases since their beginnings. These influences include military involvement, business and commercial use, medical applications, scientific research, entertainment and personal use of various forms of information technology. We believe that any discussion of the history of computing must consider these and how they interacted with each other to produce what we now know as Information and Communication Technology (ICT) in order to make this real and to achieve relevance.

5 Education: Learning by Discovery and Chance

Techniques of discovery learning originated in the 1960s through the work of Jerome Bruner who suggested that "*Practice in discovering for oneself teaches one to acquire information in a way that makes that information more readily viable in problem solving*" [13 :26]. This approach is supported by the work of learning theorists such as Seymour Papert and Jean Piaget and relates to the concept of learning by doing, following from the words often attributed to Confucius: "*What I hear I forget, what I see I remember, what I do I understand*". Abe [8] suggests that people should be given the opportunity to learn and discover through chances, that these should not be explicitly displayed but rather arranged to aid discovery and that they should be related to the person's interests and background. In the constructivist view of how students learn, teachers are often encouraged to focus on discovery learning. At one extreme this can mean that students are free to work with little or no guidance, but Mayer [14] suggests that *guided* discovery is a more effective approach than pure discovery.

In making the history of computing real and relevant to people we suggest that discovery learning has an important role to play and can be introduced through the use of interactive exhibits and displays that, after being given some idea of what to look for, encourages the user to try to find out for themselves. This is much more likely to make the history of computing more relevant that static exhibits, whether of the original artefact or of re-builds.

5.1 The Lego Approach to Discovery Learning

As is well known, one of the big advantages of Lego is that a given set of building blocks can be used to make a variety of models, and even in the case of specific purpose Lego kits many different variations on the basic model can be built [15, 16]. The construction guide for a Lego model [17] often follows the approach of:

1. Firstly providing detailed schematic instructions for building the first model
2. Followed by outline details of the construction of a similar model and
3. Finally provision of a photograph of the real object is used to suggest other construction possibilities that are left up to the builders' imagination.

Many museums offer education programs to school children on topics including the history of computing and these are certainly worthwhile. Unless they are backed up with other education or experiences, however, in most cases they are soon forgotten. One way around this is for schools to run special programs over several weeks leading up to the museum visit to interest students in the history of computing and also to follow up experiences and education. Following the Lego Approach it might also be useful to provide students with part of an idea relating to computing history and so lead them to self-discovery of what follows. Another approach is to encourage students to look for historic computers in old films or TV programs such as Star Trek and compare the flashing lights and spinning tape wheels to computers of today. The value of TV programs showing aspects of the history of computing also should not be underestimated.

6 In the History of Computing, What is Real?

This paper addresses the question of what people find real and relevant in the history of computing, why this is so, and how to increase this relevance. Do we need them to have "*things that buzz inside … and a stick-out handle*" [1 :14] or is there something else that makes things real and relevant?

Fig 6: A toy that has become very 'real'

When it was first introduced in the late 1970s many people saw the Apple // as a toy and not a 'real computer'. It was not until VisiCalc software appeared on the Apple // that people started to consider it to be real and relevant for more than game playing. Victor Frankenstein's creation [18] never became real in his novel. But if Frankenstein's monster never succeeded in becoming real in this way, in many ways it has become real, even if only as a concept, in our world as we have found a use for the analogy of Frankenstein's monster to describe any 'unnatural creation' of modern technology [2]. Returning to the Velveteen Rabbit:

> *"Real isn't how you are made," said the Skin Horse. "It's a thing that happens to you. When a child loves you for a long, long time, not just to play with, but REALLY loves you, then you become Real." [1 :14]*

Does the history of computing become real and relevant when people really 'love' it? Perhaps it becomes real when they find what they see as a significant place for it that fits into their own world.

7 Conclusion

We have argued that the history of computing will become relevant to people when they see how it can fit into their own lives and how it relates to their own society and culture. For some people this history is immediately of interest and is very relevant. For others some work is required to make it relevant. We suggest that this can be achieved through the provision of education, stories and interactive experiences. The

display of artefacts is an important cog in the job of making computer history real, but prior educational experiences will allow people to experience rich 'chances' with these artefacts. Artefacts accompanied by stories allow a visitor to a museum to become more involved and educational experiences within the environment of the artefacts are likely to increase involvement. Brabazon [19] speaks of this interaction between history, artefacts and education as "*a reflexive loop between teaching, learning, display and visitors*". The current view of the education community of a developing individual who creates their own conceptual framework from their experiences reinforces this view of the way forward in making computer history real and relevant.

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