

Ideas for teaching at Key Stage 1 about Tim Berners-Lee, William Caxton and how technology has changed our lives

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This article links teaching about Sir Tim Berners-Lee to Changes in Living Memory and Significant Individuals and makes comparisons between Caxton and the impact of earlier developments in communications technology. It provides interesting topics for discussion about significance (pupils may be surprised by the idea that they are living through an exciting period of history at the moment). It even has the potential to inspire pupils' ambitions to become the computer engineers and inventors of the future!

Learning opportunities

Pupils can:

- develop historical enquiry skills
- develop understanding of historical concepts, such as
 - continuity and change

- cause and consequence
- similarity and difference.

Who was Tim Berners-Lee and why might he be useful as a Key Stage 1 study?

Just think how the invention of the World Wide Web (WWW) has changed our lives! Primary school pupils ('digital natives' growing up in our digital, media-saturated world) have a fantastic source for historical enquiry in the adults they know (the 'digital immigrants' who can remember life before the WWW and smartphones etc). We have all lived through momentous change with the growth of digital media and many of us remember life before the web. But for a 6-year-old (even if they've been told that

'Gran didn't have computer games when she was your age' or 'people had to search for information in books before the Internet') it takes discussion, thought and investigation to properly imagine life without today's technology. Such understanding is necessary to grasp the significance of Tim Berners-Lee developing the computer coding that created the WWW and made possible the rapid growth of websites and social media.

I selected a few salient points about his life story from his book *Weaving the Web*, and debated how I could possibly explain the difference between the web and the Internet to 5–7-year-olds. A tricky task, since I only vaguely understood the difference myself! Sir Tim himself had published a useful 'Answers for Young People' web page answering

The story of Tim Berners-Lee (as I tell it)

Tim was born in 1955 in London. His parents were mathematicians. As a boy he learnt about electronics while playing with his toy train set.

In 1969 man landed on the moon. I bet Tim and his family watched it on TV. I expect they discussed how scientific invention might change our lives in the future! By 2017:

- Would we live on the moon?
- Would we have flying cars?
- Would teachers be robots? (*This usually gets a laugh*)
- Would computers be able to speak? (*Think about this one. Pupils usually say no, until we discuss things like 'Siri'.*)

One day, Tim's dad said 'Imagine if computers could think like the human brain!' Tim would remember this idea when he grew up...and went to university... and got a job at CERN in Switzerland.

In 1989 email and the Internet were already being used. Tim needed to share information by computer with people across the world. But different computers used different software. It was as if they spoke different languages. Tim found this very frustrating! So he invented

a computer code to solve the problem. It could translate different software into the same computer language. Anyone would be able to share anything! A huge web of information could be shared. The World Wide Web!

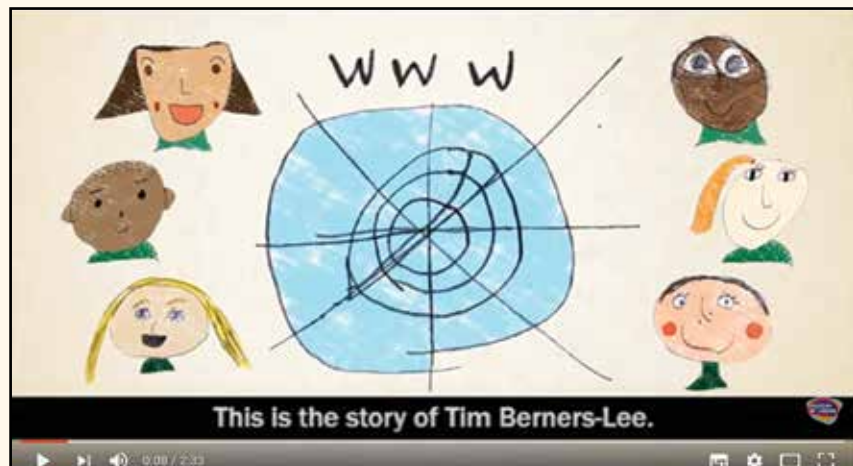
But the World Wide Web would only work if people created websites, and at first there were only a few websites. It was not until Tim persuaded his boss to make the code free for anyone to use that lots of websites started being created, and then it just grew and grew!

The web has changed our lives and how we communicate. In

2004 the importance of his work was recognised when the queen knighted him. In 2012 Sir Tim Berners-Lee was asked to appear at the opening ceremony of the London Olympics.

He is still working today to make the web safe and easy for the whole world to use.

Watch an animation of this story, created by pupils from Sheen Mount Primary, the school Sir Tim attended as a boy. museumoflondon.org.uk/sch/ks1-changes-living-memory



Key Stage 1 The story of Tim Berners-Lee animation. © Museum of London

questions that pupils of various ages have asked. This can be found at: w3.org/People/Berners-Lee/Kids.html

Much of it is too difficult for Key Stage 1 pupils, but it is useful in answering key questions such as: Why did he invent the WWW? Did he invent the Internet? What happens when you click on a link? He also makes a forceful statement about privacy, as can be seen in his answer to the question 'Can you tell me more about your personal life?'

I like to keep work and personal life separate. What is on the

web on this page and my home page is all there is. Please do not email me asking for more information for school projects, etc. Look – if you had written a program like WorldWideWeb – which you well might – would you want everyone to know what you had for breakfast? No, you see? Ok. Thank you for your understanding.
(w3.org/People/Berners-Lee/Kids.html)

While respecting Sir Tim's desire for privacy, I wanted pupils to be able to imagine him at their age, to hear a story about a London boy growing up, going

to university and developing the skills and imagination to invent something that has changed the world. Therefore I used the few nuggets of information which Sir Tim has shared about his life. I've been interested to see that most of the Key Stage 1 books and web resources now available on Sir Tim have identified the same key moments in his life story, such as the fact that he learned electronics from playing with a toy train set, although I haven't yet found another which added the moon landing into the story. I have no evidence that he watched the moon landing, but it would surprise me if he didn't.

How might this be incorporated into a Key Stage 1 activity?

Opportunities for engaging families in stimulating intergenerational learning.

Adults love helping pupils to understand twentieth-century objects, becoming excited by the personal connections they have with them (the reminiscence element alerts pupils to how quickly the technology has changed). Pupils are stimulated by seeing adults fascinated by objects from their childhoods, which leads to critical thinking and perceptive questioning, comparing childhood experiences and memories. This helps pupils develop perspective and judgement and to consolidate their chronological understanding, including imagining a time in the future when they will be grown up and may describe the technology of today to their own pupils.



Start by placing the date of birth of pupils, yourself and Tim Berners-Lee on a timeline, and asking how they think your childhood, and that of Sir Tim, might have been different from theirs.

Were there interactive whiteboards at school, or computers and mobile phones at home? Was the way we entertained ourselves with music and TV different? How were photos taken and shared?

If you are unable to find a photo of Sir Tim as a schoolboy then use a photo of yourself aged six instead. Seeing a photo of you as a child will prove to be a powerful stimulant, engaging pupils at a personal level. I would recommend that all teachers share photos of themselves as pupils with their pupils, as well as asking parents and grandparents to share images from old family photo albums (while naturally being sensitive to any families

who may not have such records or have complex backgrounds). Why not invite grandparents into class to share old photo albums and be interviewed by the pupils? Preparation could include deciding pertinent enquiry questions and follow-up could include collating photos and quotes into a timeline of childhood experiences from the last few decades. Make sure you include photos of your pupils as babies.

Next allow pupils to explore a selection of objects and try to arrange them in a rough timeline (including discussing which were around when Sir Tim was a child). The groups could include:

- writing (from typewriters to computers)
- talking (from telephones to mobile phones, Skype and FaceTime)
- Music and entertainment (from record players, radios, TV and computer games to digital downloads)
- Photography (from film to digital).

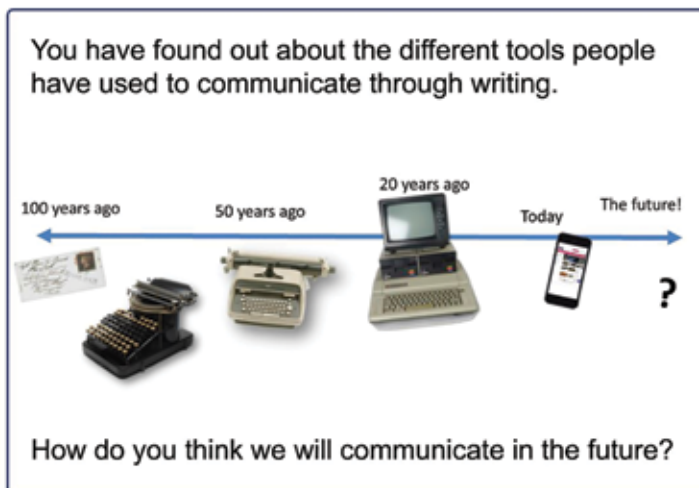
Pupils gradually notice that functions that used to require many different objects and types of technology can now all be accessed digitally on a computer, tablet or smartphone. They tend to be particularly enamoured by the typewriter, record player and dial phones. Many pupils are surprised to learn that telephones used to only work if plugged into a wall socket and that before digital photography people took fewer photos. We then use the record player, and a Beatles track, for a game of musical statues (just like Sir Tim might have played as a child).

While you could use a series of images here it is much better to have a number of artefacts so that pupils can investigate them by picking them up and touching them.

Typewriters, record players and dial phones can all be bought fairly cheaply on auction sites or at car boot sales. They make an excellent display in class or could be used in a home corner to create a 1960s home or office.

Online 'Changes in Living Memory' quizzes for use in class.

The sorting activity from the Museum of London's workshop has been adapted into three online interactive quizzes for use in the classroom. They feature objects from the museum's collection and illustrate changes in writing, telephones and entertainment. See: museumoflondon.org.uk/sch/ks1-changes-living-memory



Key Stage 1 Changes in Living Memory quiz. © Museum of London

Challenges with teaching about Tim Berners-Lee

How to explain the difference between the web and the Internet to 5-7-year-olds

In the animation, the metaphor of language and translation is used to explain that computer coding enabled sharing of information across different computer software (after all computer programmes are a form of language and the HTTP code is a form of translation).



One way to explain this complex concept is to represent it physically. Before beginning the exercise, explain what the abbreviations HTTP and WWW stand for.

1. Stand in a circle, with different pupils representing teams of people in Switzerland, London, New York and Shanghai etc.
2. Create a physical web of string illustrating the information they want to share and a soundscape of computers, all speaking different computer languages
'Beep, beep...beep...b, beep, beep'
Clickety click, clickety click, click, click...'
3. Explain that Sir Tim found this frustrating, so invented a computer code to solve the problem.
The code could translate different software into the same computer language.
4. Finally introduce a new sound to the soundscape:
'H...te, te...PEE!' (HTTP)
5. Now the pupils are all using the same sounds 'H...te' can be responded to by 'te ...Pee'

What are the key ideas we want to get across about Sir Tim's achievements?

I like pupils to feel they have met Sir Tim, so I play a few seconds of a TED talk, in which he explains why he created the hypertext coding.
ted.com/talks/tim_berniers_lee_on_the_next_web

The TED talk is aimed at adults so we only watch a few seconds. I ask pupils to put up their hands up if they hear any abbreviations such as WWW or HTTP. Pupils



enjoy seeing Sir Tim and pick up on how 'frustrated' he was by not being able to communicate easily. Most importantly, they are learning about the invention of the WWW from the man himself, interpreting a piece of filmed oral reportage as evidence, which they will not be able to do when studying Caxton of course.

Sir Tim was featured in the opening ceremony of the Olympics as one of the British heroes. It is interesting to discuss the fact that many people had not heard of him (a news commentator at the ceremony actually asked who he was) and see if pupils can come up with possible reasons why he avoids celebrity status.

The Key Stage 1 pupils I have worked with (from numerous London schools, including the primary school that Sir Tim himself attended) all agree that he is a hero of our time. But while recognising Sir Tim's heroic qualities in shaping the growth of the WWW, I believe it is also important to make it clear that he did not work alone.

One story which illustrates this is that in 1991, Sir Tim and a colleague named Robert were supposed to give a presentation about the potential of the WWW at a Hypertext conference, which almost didn't happen because they arrived to find there was no Internet access! Robert saved the day by linking through the telephone system to a university Internet system and persuading the hotel manager to string a telephone line all the way down the hall to the conference room! A year later there were lots of websites on display. Of course the web wouldn't have worked unless lots of companies and individuals created websites to share information. And of course there were the many inventions before word processors, computers and the Internet became possible, and many will happen in the future. Maybe some of these will be designed by some of your pupils, the computer engineers of the future. So let us now go back 500 years to why Caxton is still remembered today as a significant individual.

What might constitute some relevant classroom extension activities?

The National Curriculum suggests comparing Sir Tim Berners-Lee to Caxton. I find that many teachers also include the study of other earlier inventions that revolutionised people's ability to communicate and share information. It also links extremely well to the computing curriculum, as described by one teacher:

Pupils visited the museum as part of an entry point for our International Primary Curriculum (IPC) topic 'Digital games'. It has been instrumental in developing their enthusiasm and engagement with the topic. The pupils participated in discussion, object handling and story-telling to investigate Tim Berners-Lee. They are using the challenges he faced as motivation to code and create their own computer game. Rooting their learning in the terms of before and within living memory developed an understanding of chronological knowledge, which was then further embedded during follow-up activities at school.

Here is an idea from Bigland Green Primary School in east London who were investigating the question 'Is the World Wide Web the most important invention yet?'

Pupils began by describing their favourite object and explaining reasons for their choices. Key vocabulary (such as mass communications, web browser, and information and super highway) was introduced through a word- and picture-sort, and pupils were then given pictures of a number of people whose inventions have changed the way we communicate, including:

- Alexander Graham Bell (telephone -1875)
- Guglielmo Marconi (radio - 1895)
- John Logie Baird (TV -1924)
- Ray Tomlinson (email - 1971)

In teams the pupils discussed the importance of each invention, before sharing their views with the rest of the class:

- Why was it an important invention?
- How did it change how people communicated?
- Which was the most important invention?

In this exercise pupils were thinking critically, weighing up evidence, sifting arguments, and developing perspective and judgement.

My only regret was that there was no discussion about the lack of diversity represented. Clearly the list was selected due to the impact of new technology, rather

than to provide a diverse group of famous people. In order to discourage the view that men are better at maths and science than women, I think it is necessary to at least briefly discuss the reasons why so many famous inventors are white males (e.g. privilege and education) and highlight some female and BAME innovators or scientists.

Ada Lovelace could be commented on; a more recent example would be the African-American women, such as Katherine Johnson, who were skilled mathematicians and worked at NASA in the 1960s and 70s (see the 2016 film *Hidden Figures* based on a book of the same name). Another interesting lady is Rear Admiral Grace Hopper, sometimes known as 'Amazing Grace'



Mathematicians Katherine Johnson and Ada Lovelace.

Who might make a good comparison with Sir Tim?

William Caxton Merchant – Translator – Printer

William Caxton was born in Kent in 1422. At the age of 16 he was sent to London to be apprenticed to a merchant to enter the trade of the mercer. At the death of his master Caxton moved to Bruges and became a successful merchant himself. His



patron, Margaret Duchess of Burgundy, sister of King Edward IV, encouraged him to translate French literature into English. Caxton saw printing presses in Cologne and brought one back to Bruges. The first book he printed was his own *Recuyell of the Historyes of Troye*. It was probably the first book printed in English. In 1476 Caxton brought a printing press to London and set up in Westminster. There he printed over 100 books, sometimes translated from French, Dutch or Latin. One of the first printed was Chaucer's *Canterbury Tales*.



Activity:

- Use the town criers of medieval times as a stimulus for a game of Chinese whispers, which will quickly demonstrate that when sharing information orally a message can easily become garbled and confused.
- Pass a piece of written information around the pupils to be read aloud by the last child, thus demonstrating the value of the written word.
- Explore the printing process during art lessons. This will help pupils understand the revolutionary nature of printed rather than handwritten books.

This will help pupils to understand why handwritten books were so rare and expensive in comparison, and that by printing and making books in English, Caxton made books available to less wealthy people, so increasing literacy. This led to a technological revolutions as it enabled information to be shared more quickly. Think of all the types of information that was recorded in books. We probably would not have all Shakespeare's plays if they had not been printed in that first Folio!

It is said that the rate of change is linked to the speed of communication. A good activity to demonstrate this was suggested by a teacher from Buckingham Preparatory School, whose pupils were set the following task, prior to visiting the Museum of London for a workshop.

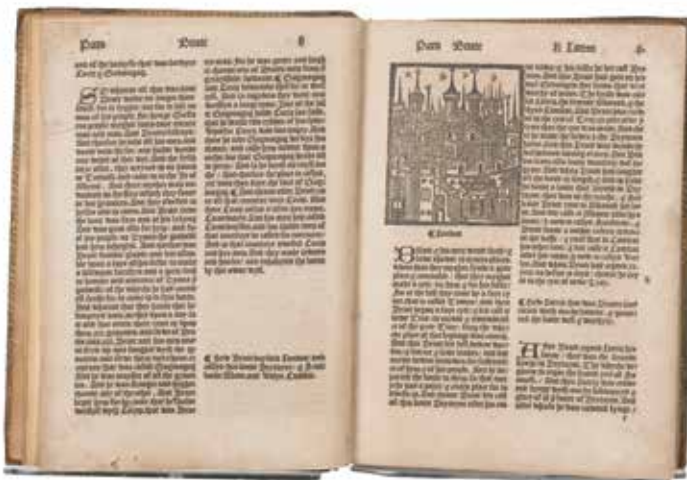
One group of pupils were asked to search books in the library, while others searched on the web, to find out the answer to the question 'What do orangutans eat?' (Clearly almost any question could be used.) Impressively the pupils using books did find an answer, but clearly the web search was quicker and offered lots more to choose from. This exercise could also lead into discussions of which sources of information to trust.

Where can I find out more about this topic?

There are numerous online resources available to help you plan your classwork. For instance, PlanBee offer a set of seven lesson plans covering the history of communications and the lives of Caxton, Bell and Berners-Lee. These conclude with a comparison activity that involves completing a Venn diagram from a set of statements, such as:

- I helped people share information more easily
- I was born around the year 1422
- I am a computer scientist.

Pupils select which are true of both Caxton and Berners-Lee and which are only true of one or the other.



Comparing Caxton and Tim Berners-Lee

Learning opportunities:

To understand and make comparisons between the vision and impact of Caxton's introduction of the printing press to Berners-Lee's creation of computer code and promotion of the WWW.

When we get into comparisons between these two men it is important to acknowledge that Caxton was not an inventor. (Gutenberg is generally credited with the invention of the printing press). Historical context is clearly needed to enable understanding of the impact of Caxton setting up the first printing press in England.



Resources

I am currently redeveloping the museum session to focus on a comparison between Caxton and Berners-Lee, although including Caxton's story will necessarily involve reducing the detailed study of Berners-Lee and changes in recent technology. I will be exploring how best to tell Caxton's story in a enjoyable and interactive manner, and how to put Caxton's life in context through the museum's collections. This will include visits to our Medieval London gallery to examine beautiful illuminated manuscripts and some of Caxton's original publications which are on display, and to learn about the trade of mercers such as Caxton.

Perhaps I will sit pupils in rows, like medieval monks, to try copying a section of a manuscript. We will certainly explore the fact that Caxton did not invent the printing press, but was instead a businessman (the Lord Sugar of his day) with the vision to see its potential and to use it to manufacture and sell books in English.

Why didn't Gutenberg make much money from his invention?

Was Caxton's work in creating and marketing books as important as the actual invention of the printing press? In comparison, is Sir Tim's work in marketing the potential of the WWW as important as his coding of HTTP and HTML?

Is it the vision to see the potential for improved communications for the whole of humanity that makes these two men such significant individuals?

The ideas in this article are based on a Museum of London Key Stage 1 workshop; a new Key Stage 1 online resource; and on some examples of thought-provoking classroom teaching by teachers consulted during development.

Damian Harvey, *Tim Berners-Lee*, illustrated by Judy Brown. History Heroes series, London: Franklin Watts, 2015.

Damian Harvey, *William Caxton*, illustrated by Judy Brown. History Heroes series, London: Franklin Watts, 2015.

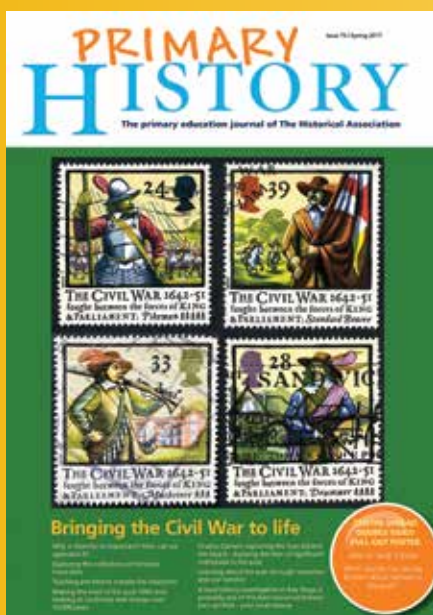
Nick Hunter, *William Caxton and Tim Berners-Lee*, Comparing People from the Past series, London: Raintree, 2015.

Charlotte Guillain, *Spreading the Word: William Caxton and Tim Berners-Lee*, London: Collins Big Cat, 2015.

I would like to thank the teachers who have helped to trial and develop the workshop and online resources, and I would love to hear from any teachers who would like to trial the new workshop at the Museum of London. Please contact me at: nsprigge@museumoflondon.org.uk

Information on the museum workshop and links to online resources can be found at: www.museumoflondon.org.uk/schools/session-detail?id=267

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