



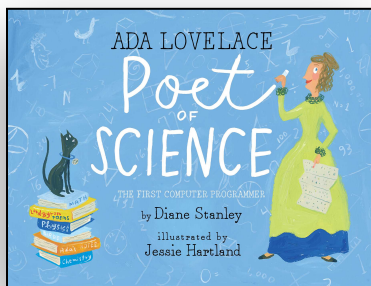
Cruchley's Collection

Diana Cruchley is an award-winning educator and author, who has taught at elementary and secondary levels. Her workshop are practical, include detailed handouts, and are always enthusiastically received.



Diana Cruchley©2018. dianacruchley.com. or diana cruchley on Pinterest

Ada Lovelace: Poet of Science, The First Computer Programmer



Diane Stanley

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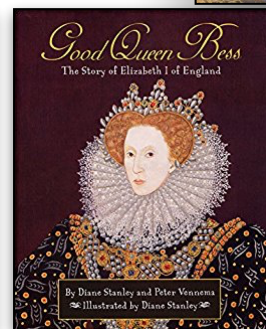
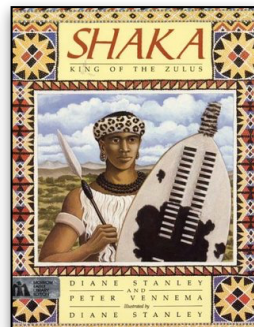
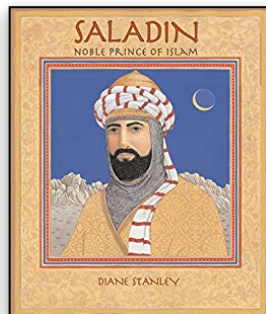
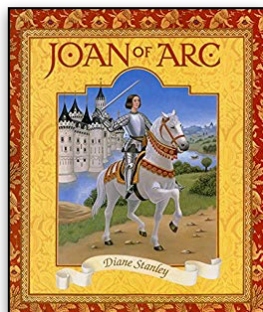
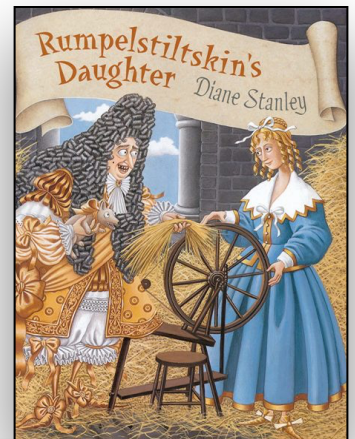
The story of how 200 years ago, the daughter of Lord and Lady Byron, Ada Lovelace, wrote the first program - before there was electricity to make it work. Working with Thomas Babbage on the Analytical Engine, she wrote step-by-step how Bernoulli numbers could be coded for the machine.

Teaching Ideas

The Author

Diane Stanley has written over 50 books, most of them for young readers. Sixteen of her books are about historic characters from Shaka: King of the Zulus to Cleopatra, from Joan of Arc to Leonardo Da Vinci, and from Saladin to Peter the Great.

She is also the author of **Rumpelstiltskin's Daughter** for which there are many teaching ideas on my website at dianacruchley.com



Diane Stanley: An Author Study

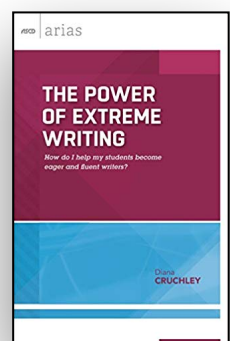
Because Diane Stanley has written at least 16 books about historic characters, now might be a good time to do an author's study. Begin by gathering as many copies of all 16 of them as you can. For the purposes of an author study that can be done quickly, students should read 3 of them, not counting *Ada Lovelace: Poet of Science*. That would provide them 4 to consider. Below is a possible outline for their report:

- 1. RANK:** List them from favourite (#1) to least favourite (#4). Summarize each book in a paragraph, with a sentence for each indicating why they are in that position.
- 2. DIANE STANLEY'S LIFE:** Write 20 sentence facts about Diane Stanley's life. Check her website and at least 2 other sites. Her website is dianestanley.com. There is also information about her from Wikipedia and from penguinrandomhouse.com. Include whether you think what she says about herself is reflected in her books.
- 3. ART:** Check her website's "art stuff" section for an explanation of how she does her illustrations. She has many styles of art. Of your 4 books, which did she illustrate herself? Which style of art did she use for each? Why do you think so?
- 4. ADDITIONAL FACTS ABOUT THE HISTORIC CHARACTER:** Take one of the books that has the least number of additional notes about the historic character and research 10 additional interesting facts she does not include. Do they make a difference to how you see the historic figure?
- 5. HOW MANY WORDS IN HER BOOK:** Approximately how many words are in each book. Count 3 of the pages from the middle of the book, total, and divide by 3 to create an average number per page. Multiply that by the number of pages in the book (Usually 32). If you have something interesting to say about a topic you have gathered information on, this is all you need to write to be an author who makes money for your work.

Extreme Writing Topics

Always present three possible topics for extreme writing so that students will have a choice. My book, *The Power of Extreme Writing*, is available from ASCD for a complete explanation of this unique approach to journaling.

1. Write about computers in your life. What do you use computer "devices" to do?
2. Things I have built (or explained to someone else) in my life.
3. Write a set of step-by-step detailed instructions for something simple such as filling a dishwasher, setting the table, etc.



British Peerage

There are so many directions you can go with this book for all its simple prose, because there are so many interesting references. For this one, let's look at the British Peerage. There are 5 ranks. From highest to lowest they are Duke, Marquess, Earl, Viscount, and Baron. Ada's father was Lord Byron, which would make her The Honourable Ada Lovelace as a Young Woman. On the other hand, her husband was Earl of Lovelace, which would make her Countess Lovelace when she was living her ordinary life as a wife and mother of 3 children.

The Daughter of Lord Byron

Lord Byron was a leading light of the Romantic Movement and a superb poet. He inherited his title at age 10 and was educated at Harrow and Cambridge then went on the Grand Tour which all young noblemen did. With the Napoleonic Wars in full flow he went to the Ottoman Empire, Portugal, Athens, instead of France and Italy which was traditional. He became a celebrity in England with the publication of his first major poem, “Childe Harold’s Pilgrimage.” In the next few years he was a prolific writer, but also led a scandalous life. He had an affair with the married Lady Caroline Lamb who labeled him “mad, bad, and dangerous to know.” (She created a huge scandal when he broke off the relationship. In spite of that, her husband eventually became Prime Minister of England. Byron eventually married Annabella Milbanke (Ada’s mother), but that marriage ended in one year with Byron fleeing the scandal of his many affairs. He never returned to England and died 8 years later.

All of this and much more lies behind the simple paragraph: *Ada’s parents were as different as chalk and cheese Her father, the famous poet Lord Byron was a worldwide celebrity the rock star of his time.*

You might want to read the sentence from the book, and then give the students some of the background behind that simple sentence. Ask students why they think Diane Stanley left all of that out? (Perhaps there was not room, but more likely because it would distract from her accomplishment which was astonishing - inventing programming before there were computers or electricity.)

Memorizing Poetry

I always recommend memorizing significant poems or parts of poems just so that students have a “literate” background. Ask students to memorize just the first **four** lines of **She Walks in Beauty**, one of Byron’s most famous poems. This poem has been quoted in many books, movies, and TV shows. Test them by asking them to write it out. Do not mark for capitals or punctuation but do mark for lines because they show where the rhymes are. Then put into your planning book to ask students to chorally recite the lines 2 days later, a week later, than a month later. Intermittent reinforcement is how to get it to stick.

She walks in beauty like the night
Of cloudless climes and starry skies,
And all that’s best of dark and bright
Meet in her aspect and her eyes
Thus mellowed to that tender light
Which heaven to gaudy day denies.

Now might be a good time to discuss the part of the title that says **Ada Lovelace: Poet of Science**.

Can a Computer Think?: Lady Lovelace’s Objection

Both Alan Turing (whose team broke the Enigma Code in WWII and whose life is the basis of the movie **The Imitation Game** with Benedict Cumberbatch and also *Code Breaker*, a 2012 documentary) and Howard Aiken (who was the conceptual designer behind IBM’s Harvard Mark I computer) read Ada Lovelace’s directions for the Analytical Machine.

Lady Lovelace’s Objection is “A computer can’t think. It can only follow directions.”

Following on that came The Turing Test: If an independent evaluator knows that one partner in an exchange is a computer and the other is a human, but he/she can't tell which is which, then a computer has said to have passed the Turing Test.

Discuss with students: What clues do you have when you are talking to a computer and when a person? Can you tell a CGI scene in a movie from a real occurrence? (how do you know? (That instinct is called "the uncanny valley") How does the map directions "person" get a voice for so many directions? What do you think about the future of thinking computers?

Algorithms

Because we are introducing programming at earlier ages, now might be a good time to explain the concept of an algorithm - an incredibly detailed set of directions to do something. We have "algorithms" in our head to do many automatic tasks - tying shoes, getting dressed, typing, searching on the Internet, etc. For a computer, an algorithm can't miss a single tiny step...but to avoid having to develop a part of the code each time, if you need to count something, in the game you are designing, you "plug in" the "count this" algorithm, already designed by an earlier programmer.

The Khan Academy has a really good explanation of algorithms at <https://www.khanacademy.org/computing/computer-science/algorithms/intro-to-algorithms/v/what-are-algorithms>

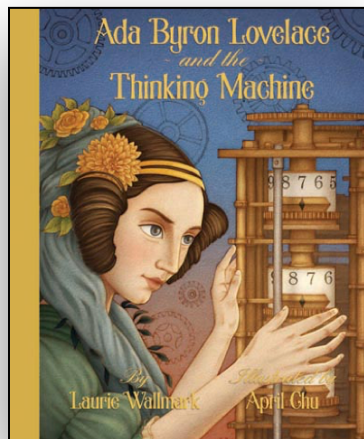
Ask students to write the most detailed algorithm they can for something like borrowing a book from the school library, or riding on public transit, or making the grilled cheese sandwich, or??? Students can suggest possibilities. They can exchange and "debug" each others algorithms, by pointing out essential, simpler steps that need to be included or errors that would have them frying the sandwich before putting the cheese in.

Coding For Themselves

Swift Playgrounds is an Apple program, usable on an i-pad with a touch screen, that allows students to have a ton of fun walking their little character around obstacles to capture the gem. Each level adds a new twist, and a new command. Since they are all shown on the bottom of the screen, with what they will do when used in the program, students will be able to progress quickly with the principles of coding, without having to memorize code.

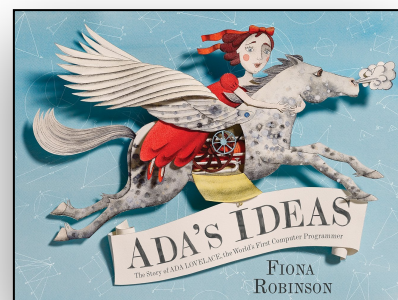


Other Ada Lovelace Picture Books



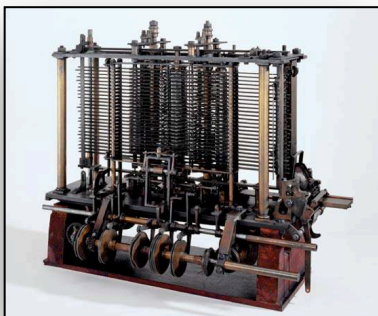
Ada Byron Lovelace and the Thinking Machine and Ada's Ideas: The Story of Ada Lovelace, the World's First Computer Programmer are two other picture books about Ada Lovelace's contribution to the development of the computer.

If you can have both of them to read, it would be interesting to have students' opinions on which they enjoy more and to discuss how the information in each of them affects how they view her.



Vocabulary

There is a glossary at the back of the book for terms such as *anatomy*; *automatic*, *calculate*, *digital computer*, *mechanical*, *numbers of Bernoulli*, *operation*, and *rational*.



Building the Analytical Engine

Both Lovelace and Babbage died before the engine could be built. In 1991 a team decided to construct a model of the actual engine which is shown below. Trying to figure out how the actual cards would work is still a work in progress.

The Ada Lovelace Doodle

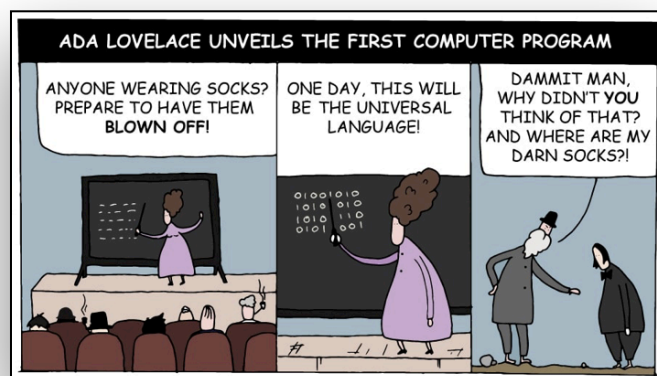
Google creates a Doodle for each day of the year, to commemorate important, and sometimes silly, achievements. Sometimes these are animated as tiny games. On December 12th, 2012, the Google Doodle of the day honoured the 197th birthday of Countess Ada Lovelace.



I've also included a cartoon version of Ada Lovelace presenting her first program.

Celebrating Ada Lovelace Day

Ada Lovelace Day is the second Tuesday in October. It is a day to celebrate the achievements of women in STEM. A website with ideas is at <https://findingada.com/>



Writing Under a Pseudonym or Nom De Plume

Lady Lovelace signed her work L.L. First explain what a *pseudonym* or *nom de plume* is. The author Virginia Woolf is famous for saying, “for most of history, anonymous was a woman” which means that women’s intellectual work has mostly been ignored, forgotten, or they never signed their work in the first place. There are many female authors who use only their initials, or a man’s name for their writing. A publication with a man’s name on it is still 5 times more likely to be published than if it has a woman’s name

on it - subconsciously being perceived as less “serious” than that of men, or that men are only interested in reading works by other men.

Some famous nom de plumes of women who wrote under men’s names or initials include: George Eliot, JK Rowling, JS Penn, Ellis Bell (Emily Bronte), Currer Bell (Anne Bronte), Acton Bell (Charlotte Bronte), A.M. Barnard (Louisa May Alcott), George Sand, Vernon Lee, Isak Dineson, James Tiptree Jr, Rob Thurman, Magnus Flyte, and S. E. Hinton (The Outsiders) See the list of these authors and their famous works at my website entry for this book at dianacruchey.com

Unrecognized Women Scientists and Inventors

Historically there has been a lack of recognition of the work of women scientists, beyond Ada Lovelace. It is often true as well that their work has actually been credited to others. It might make an interesting quick research project for students to select a woman to investigate. What was the discovery or invention? What happened?

1. Rosalind Franklin, DNA. The Nobel prize went to Watson and Crick.
2. Chien-Shiung Wu, disproved the law of parity. The Nobel prize went to Tsung-Dao Lee and Chen Ning Yan.
3. Jocelyn Bell Burnell found the first pulsar; Antony Hewish and Martin Ryle got the Nobel prize.
4. Esther Lederberg found a bacterial virus. Her husband and two others got the Nobel prize.
5. Lisa Meitner, atomic nuclei can split in two, Otto Hahn won the Nobel prize.
6. Nellie Stevens discovered sex is determined by chromosomes. It was credited to Thomas Hunt Morgan.
7. Margaret Knight patented a paper bag machine. The patent was stolen by a man although she won her case in court.
8. Elizabeth Magie invented Monopoly (she patented it as *The Landlord’s Game*. Parker Brothers credited it to themselves.
9. Judy Malloy wrote the first hypertext fiction. That “first” was credited to Michael Joyce.
10. Candace Pert found the receptor that allows opiates to lock onto the brain. Dr. Solomon Snyder received and award for it
11. Martha Coston designed the signal flares for US Naval vessels. The patent went to her husband Franklin Coston although he had been dead for 10 years.
12. Mary Anning is now famous as a British finder of fossils. She was unrecognized because of her class and sex.
13. Marthe Gautier discovered the cause of Down’s syndrome. Two men received the credit.
14. Emmy Noether’s theorem united two pillars of physics: symmetry in nature and the universal laws of conservation. Her foundational work was used in the textbook by B. L. van der Warden but not mentioned by him until his 7th edition.

Youtube of Ada’s Life

There are two worth YouTubes that describe Ada Lovelace’s life:

- Ada Lovelace: great minds: <https://www.youtube.com/watch?v=uBbVbqRvqTM>
- The Brilliant Life of Ada Lovelace: <https://www.youtube.com/watch?v=i0ygB1MfmrA>