TED TALK LESSON

THE ERA OF PERSONAL DNA TESTING IS HERE

TEACHER'S NOTES

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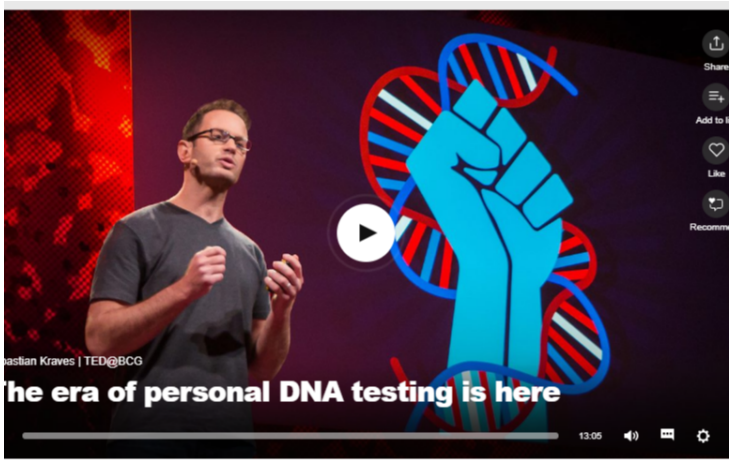


Sebastian Kraves | TED@BCG
The era of personal DNA testing is here

https://www.ted.com/talks/sebastian_kraves_the_era_of_personal_dna_testing_is_here

Vocab matching answers

1. e
2. b
3. a
4. c
5. d
6. f
7. h
8. g

Vocab gap-fill answers

1. mind-blowing
2. truffles
3. knock offs
4. double helix
5. swine flu
6. swab
7. bigwig
8. innovate

Ted Talk video answers

1. Roughly two weeks.
2. 3 billion letters.
3. No, only a few parts carry important information.
4. 1993.
5. False, it is very hard to predict.
6. A fungus that grows from the roots of living trees.
7. Just 24 hours.
8. 250 miles high.

Warmer questions

- What is DNA?
- When was DNA first discovered?
- What can be found out from our DNA?
- Have you ever taken a DNA test?

Reading section

Highly connected

Technology is changing every part of our lives. There was a time in the 1980s when using a mobile phone was a rare and uncommon sight. The first mobile phone was a simple device to make and receive calls. There was not a touch screen, or display, no internet access, and to make things less desirable from modern standards, it was about 3kg in weight and about the size of a brick – yes a brick. That said, the innovation of the mobile phone has taken us into a future no one could have predicted. In 2018, there are roughly 4 billion mobile phones, that's enough for 63% of the global population. The phone is a now an affordable device which helps millions.

What if the same can be for DNA testing and analysis? When this technology was first developed in 2004, it often took weeks and needed the use of several special machines which costs millions of dollars. Again, with improving technology and well-funded innovation, these machines have become cheaper, and many are now much, much smaller. So small, that they can be moved by hand and can be set up and installed in remote places in the world.

Personal testing

Today, there are many companies which offer individuals the chance to sequence (or analyse) their DNA. By doing so they can learn more about their genetic history, find out if they have genetic illnesses (like Alzheimer's disease), and tailor future health care for themselves. These mail-order kits range between £50 – £100 and their popularity is growing and they promise to sequence your DNA within a week or two. Once you send your sample back to the company, via post, you will be able to log onto a website where you can see information about your DNA. This information is usually stored on company servers and they agree to hold it for you.

The high price of data

Perhaps the most interesting issue surrounding the use of DNA is that once it has been analysed, the unique set of information in your sample is now converted into data. This data is unique and no other living animal has this particular string or letters. The danger many see is that there could be:

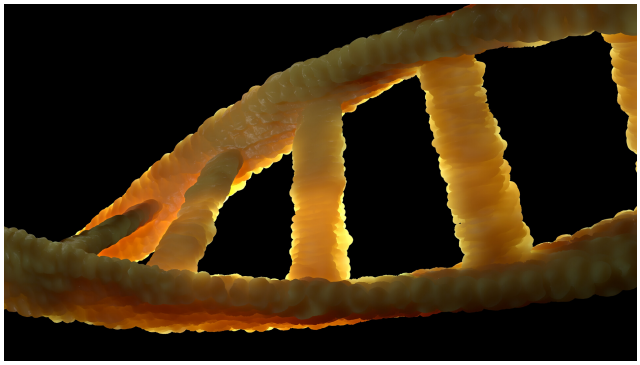
- a data breach. Your unique DNA code could be stolen by hackers and misused.
- your personal DNA sequence cannot be anonymous because it is unique to you.
- some medical companies may not give you insurance if you have a genetic condition.
- you DNA data can be bought and sold like a product. It no longer belongs to you but it has become a company asset

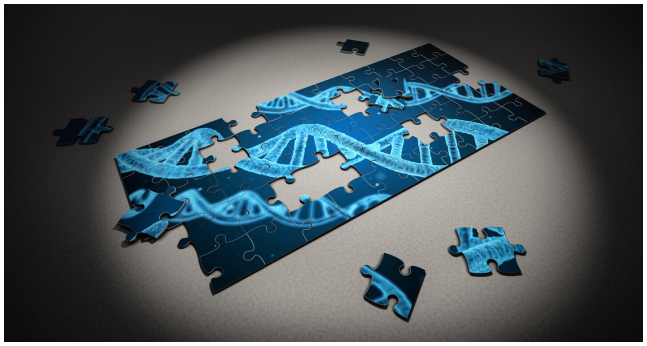
Questions which arise from this

- How much privacy can be lost by using these services?
- If someone found out they have particular genes for sport, intelligence, and for long life, could this negatively affect them?
- Is DNA information a product. If you were able to sell your DNA data, would you do so? Why or why not?
- Can companies be trusted to keep your data safe?
- Can companies be trusted with your DNA data. Could they use the data for something that it was not originally for?

Task: Public speaking

Using the images below, make a short story using your own ideas and thoughts. Ensure that you can speak for 2 minutes about your story in front of your group.





Vocabulary matching

Using the words on the left match them to their real definitions.

1. swine flu.	a. The shape of DNA.
2. (to) swab / a swab	b. To take a small sample from the mouth of an animal or person so their DNA can be tested.
3. double helix	c. A very important person who makes decisions (informal).
4. a bigwig	d. A new or creative idea that has not been used before.
5. innovative	e. A type of disease that affects farm animals and spreads quickly.
6. truffle	f. A type of food
7. a knockoff	g. When an idea or concept is amazing
8. mind-blowing (adj)	h. A product which is not real, authentic, genuine. (informal)

Vocabulary gap-fill

1. When Professor Smith produced a _____ experiment which changed the course of history.

2. French cuisine is known to use _____ to prepare dishes.

3. There are many companies producing _____ of big designer brands, but they're still popular with consumers.

4. The shape of DNA is unlike anything else, it's _____ shape means it is able to compress lots of information in a small area.

5. In recent years many farmers around the world have suffered from a _____ outbreak which has killed tens of thousands of farm animals.

6. Keiko wanted to know more about her DNA history so she took a _____ and then sent it off to be anaylsed.

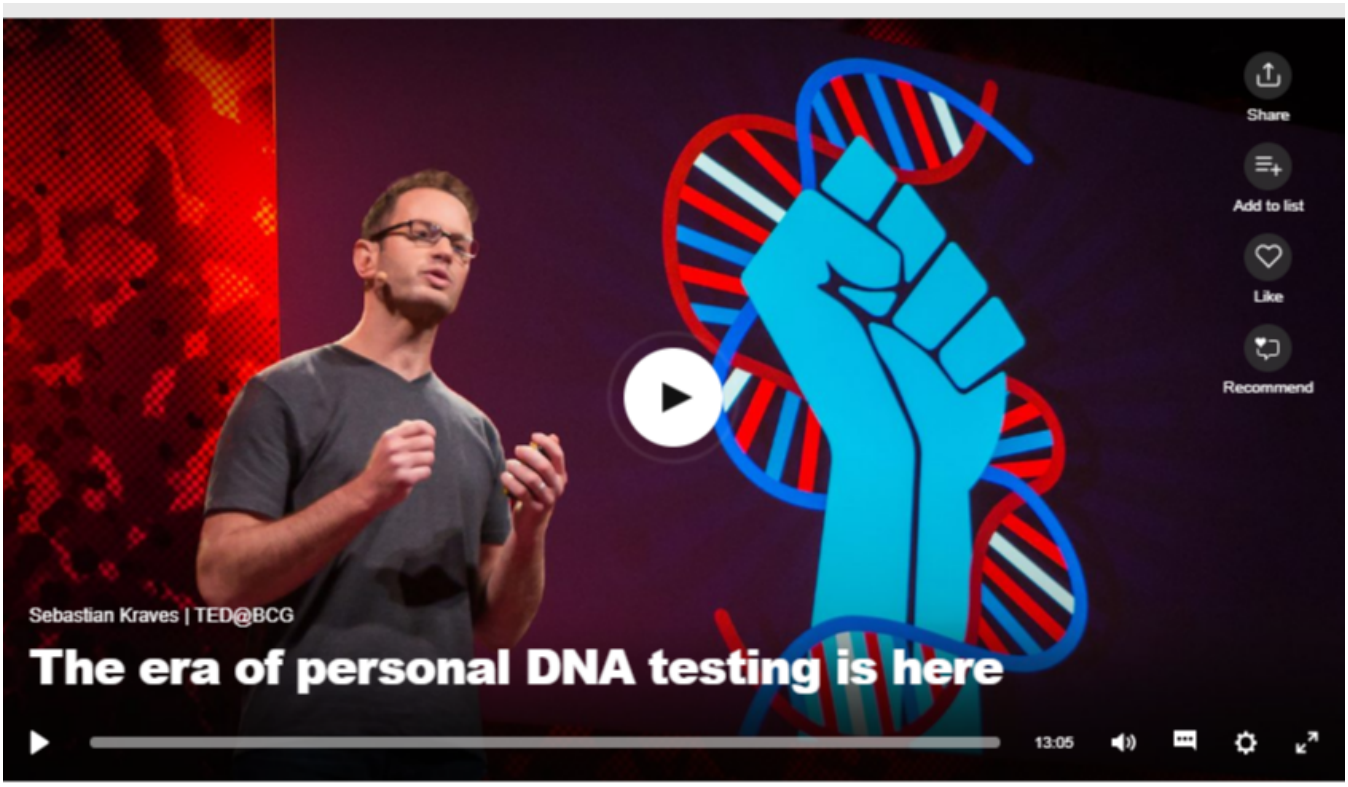
7. You can tell he runs the company because he acts like a real _____ .

8. Sebastian believes that if companies don't _____ then the full potential of home DNA testing can not be realised.

Video section

From improving vaccines to modifying crops to solving crimes, DNA technology has transformed our world. Now, for the first time in history, anyone can experiment with DNA at home, in their kitchen, using a device smaller than a shoebox. We are living in a personal DNA revolution, says biotech entrepreneur Sebastian Kraves, where the secrets buried in DNA are yours to find.

https://www.ted.com/talks/sebastian_kraves_the_era_of_personal_dna_testing_is_here



Watch the video and then answer the questions below

1. How long does it take a pig farmer to typically diagnose problems with their animals using current techniques?
2. How many letters are there in the typical DNA molecule?
3. Do we need to read all the letters in DNA to analyse it?
4. When was the DNA copying technique first invented?
5. Sebastian thinks it is very easy to know where new DNA analysing technology will go. (true or false)
6. What is a truffle?
7. How long did it take Professor Goodfellow to detect, diagnose, and sequence the Ebola virus?
8. How high is the International Space Stationo orbiting the Earth?

Advantages of personal DNA testing

1. You're able to find out about your personal history. If others take the DNA test, you might be able to find long-lost relatives.

2. It makes people more aware of how diverse people are. Many who have taken these tests have found that a percentage of their DNA is from places where they don't have family or any contact with. It unites people and helps create a global civilisation.

3. You are better able to take care of your health. What if you are 20% more likely to develop a particular genetic illness that was not present in the rest of your family? Having this information allows you to make plans and get treatment.

4. You are able to find out your talents. What if you were tested at a young age, your parents may discover you have a sports gene. Your natural-born talent could be nurtured at a very early age.

5. This technology can further extend the limits on science and its potential (undiscovered) uses.

Disadvantages of personal DNA testing

1. Hospitals and health insurance companies may use this information to discriminate against patients. If you have a gene which gives you cancer (but you currently don't have cancer) you might be asked to pay more for your medical insurance. This is discrimination.

2. Your DNA data can be stolen and the chance for you to get it back is close to zero. Once it is on the internet it is gone forever.

3. Large companies might use your data to run simulations of medicines on it without your permission. There are many examples in the past where companies have used customer data to test new products on them.
4. People may link genetics to life outcomes instead of encouraging better lifestyles. By focussing on DNA, the way people live, what they eat, what their passions are become ignored. It is true, we might be able to find the next Olympic athletes using this method, but would they want to be sportspeople?

5. For dating, it could become a trend to share your DNA data with boyfriends and girlfriends to see if you are a good match. This is further alienate people and make your genes more important that your habits, character, and upbringing.

Task

How many more points can you think of that are related to the ideas above? Write your thoughts below and then discuss in your group.

Extended discussion questions

1. Do you know much about your family history?

2. How important is it to know where your genes are from?

3. How willing are you to get your DNA analysed for genetic diseases?

4. Are you comfortable with large corporations (like pharmaceuticals, tech firms) to store your DNA forever?

5. Would you get your young children (say, under 5 years old) tested for what traits they have?

6. How would you feel if the company's servers were hacked and your DNA data was stolen?

7. What potential positive uses can you imagine with cheap portable DNA testing?

Potential debating topics

1. Personal DNA testing is a public health disaster waiting to happen.

2. Technology companies cannot be trusted to keep our DNA data secure.

3. Your upbringing, family life, education, and personal passions are more important than your blood.

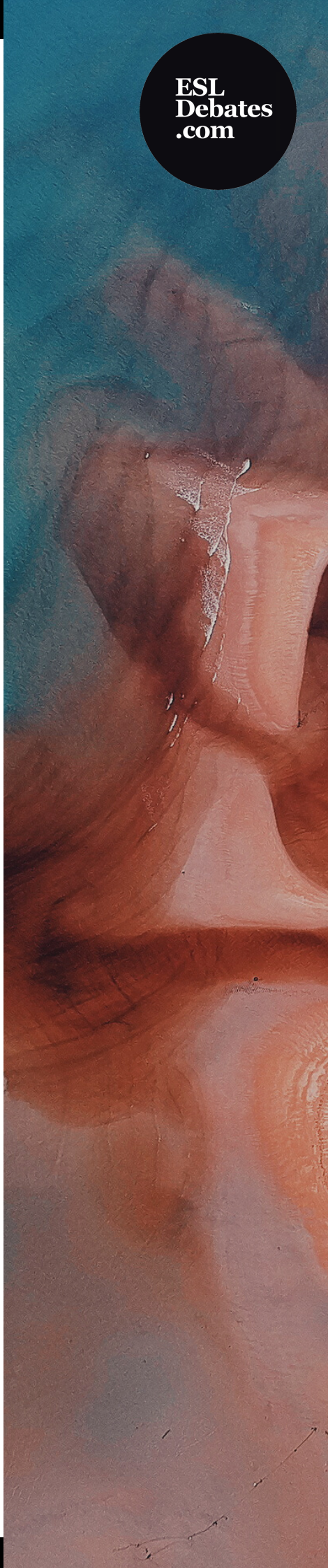
4. Your DNA makes you who you are.

5. DNA data on patients will make health diagnosis easier, faster, and cheaper.

6. Should genetic testing be allowed.

7. Is too much information bad for your health.

8. DNA testing is a waste of money.



Group roleplay and discussion task

This task allows students to imagine the needs and desires of different groups of people involved in this topic. There are many opposing desires, like that of health insurance companies which is contrasted with the concerns of consumers.

Activity set up:

- Divide students into four groups (two students per group is plenty).
- Print and hand out one group description per team.
- Allow students time to think about the perspective of their selected group. Also, give them a separate space to discuss away from other groups.
- The questions on the group cards are to be asked to another team, but the group can also think of their own and prepare their own perspective. Students can alternatively use the internet to research the topic or the questions before merging together to share their perspectives.
- Merge groups so that group 1, group 2, group 3, and group 4 are together and can argue the position of their group.
- Allow time for all points to be made
- Once done, encourage students to come to a consensus.

Group roleplay and discussion task

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Group 1: Informed consumers

Desires: You like to use the latest technology to better understand yourselves. You are curious and the knowledge is just to inform yourself.

Fears: Data privacy, data storage, hacking, inaccurate DNA information.

What other fears and desires might informed consumers have?

Point one _____

Point two _____

Point three _____

Questions you can ask others

Why should consumers have access to personal DNA tests?

How would access to the tests help patients become more proactive about their health?

How do consumers and patients respond to doctors' concerns that they may have difficulty interpreting the results of genetic tests without a health professional's guidance?

What other questions can you ask?

Group roleplay and discussion task

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Group 2: Doctors opposed to consumer access to personal DNA tests

Desires: Patient health and accurate information, reassure patients.

Fears: Oversensitive analysis of DNA data, patients without medical expertise making medical decisions.

What other fears and desires might doctors opposed to consumer access have?

Point one _____

Point two _____

Point three _____

Questions you can ask others

Are most health conditions determined by one single gene?

What concerns do some doctors and scientists have predicted a person's risk of developing diseases like cancer?

Why should genetic tests only be carried out under the supervision or counseling of a doctor or other health care professional?

Can access to personal genetic information ever harm someone? How?

What other questions can you ask?

Group roleplay and discussion task

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Group 3: Doctors who support consumer access to personal DNA tests

Desires: Greater patient confidence in their health decisions.

Fears: Cost of DNA testing, will patients be able to get their data from DNA testing companies.

What other fears and desires might doctors who support consumer access have?

Point one _____

Point two _____

Point three _____

How would easier access to genetic tests improve the relationship between doctors and patients?

How would access to genetic testing help patients prepare for taking care of their future health care needs?

What other questions can you ask?

Group roleplay and discussion task

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Group 4: Members of the state legislature, considering a ban on access to genetic tests

Desires: For citizens to make choices for themselves, for health companies to act responsibly.

Fears: Citizens being cheated or tricked into complex agreements with DNA testing companies, data security, doctor and patient care.

What other fears and desires might members of the state legislature have?

Point one _____

Point two _____

Point three _____

Why are some medical and health organisation asking for more government regulation for DNA testing?

What are some of the health care privacy issues associated with genetic testing?

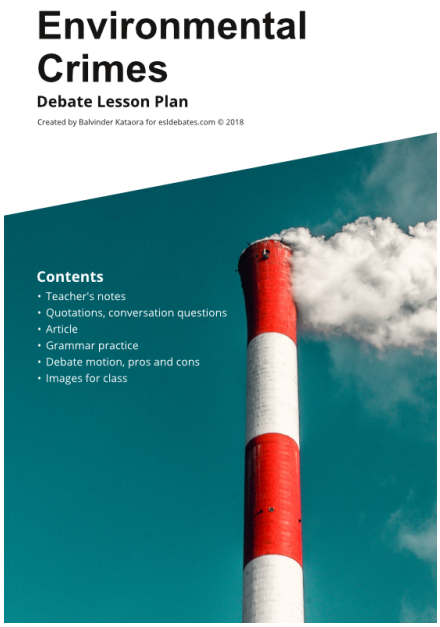
What happens if employers or insurance companies gain access to a person's genetic information?

What other questions can you ask?

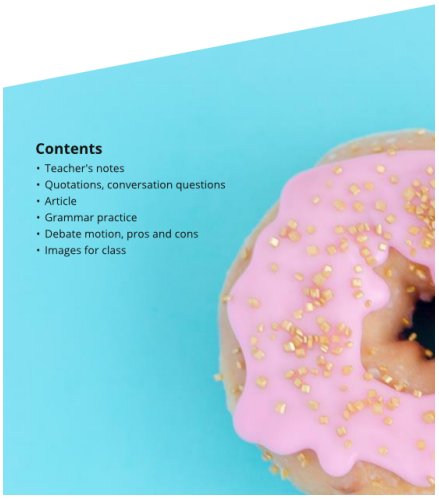
DEBATING PLANS

PREMIUM 30-PAGE DEBATING LESSONS ON DOZENS OF TOPICS

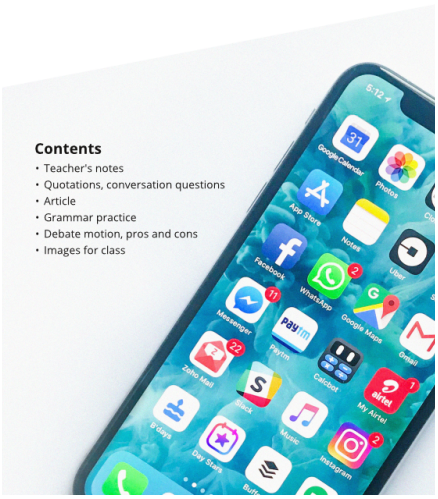
These lessons are extensive and includes a magazine-like introduction, a 2-page article, vocabulary section, grammar exercises, and images for discussion. To help students organize their debate, worksheets are included for appropriate language and pros and cons to get them started. In total these lesson plans offer 30 pages of activities and tasks for students.



Should natural features be given legal rights to protect them from pollution? This debate will target issues relating to how to legally protect the environment and criminalise pollution.



What are the best ways to tackle obesity? Some people advocate better food education, while others want to tax people to change their spending habits. Which is the most effective?



People are becoming increasingly concerned about social media. Discuss the main issues and find out what your students think and why.