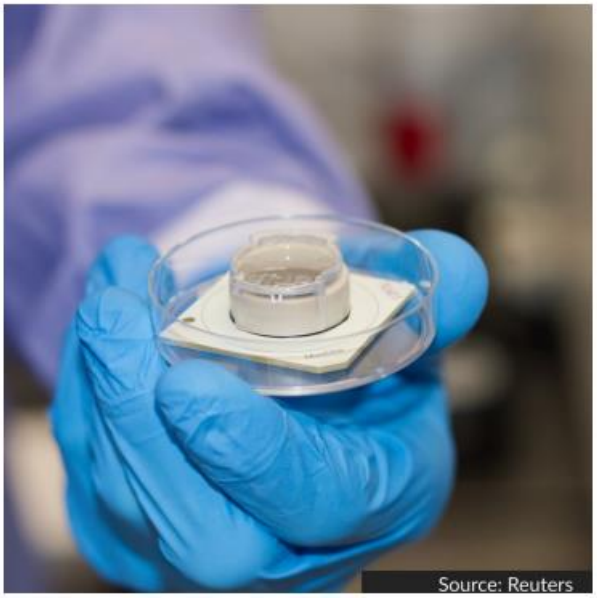
MINI-BRAIN LEARNS TO PLAY VIDEO GAME


Source: Reuters

Task 1

Discuss the questions in pairs or small groups.

1. Have you ever played the video game Pong?
2. Do you enjoy playing video games in general? Why/why not?
3. Would you rather play a tennis video game, or a real game of tennis?
4. Do you think that video games can be good educational tools?
5. Is it possible to be completely sure that something is real?

Task 2

Pre-listening task: vocabulary focus

Part A: Match words with the correct definitions.

1.	varying (adj.)	a.	make a film, recording or other product available to the public
2.	release (v)	b.	make a determined effort to deal with a difficult problem or solution
3.	cell (n)	c.	a word or phrase used to describe something
4.	disorder (n)	d.	a condition or illness that causes problems with the way part of the body or brain works
5.	tackle (v)	e.	an illness or a medical problem that you have for a long time because it is not possible to cure it
6.	condition (n)	f.	the smallest unit of living matter that can exist on its own
7.	score (v)	g.	describing something that changes in size, strength, number, nature, etc.
8.	label (n)	h.	win points, goals, etc. in a game or competition

Part B: Complete the sentences with the missing words from Part A. You may need to change the form of the word.

1. Many developmental _____ first appear during childhood.
2. The government promised to _____ the problem but failed to do so.
3. Giving health problems _____ can sometimes make patients feel worse.
4. A car needs to be safe to use at _____ speeds.
5. There are three main types of blood _____ in the human body.
6. My _____ can't be treated, but it can be managed with the right diet.
7. In football, all you need to worry about is _____ more goals than the other team.
8. Two films were _____ last week, and both of them were about volcanoes.

Task 3

Listening for specific information

Listen to the report and write the missing information in the gaps provided.

a. _____ When the game "Pong" was originally released

b. _____ The name given to the mini-brains that learnt how to play "Pong"

c. _____ The number of minutes it took the mini-brains to learn the rules of the game

d. _____ The number of human and mice cells which were used in the experiments

e. _____ The number of games of Pong that were played during the experiments

f. _____ The lead author of the study

g. _____ When mini-brains were first developed

Task 4

Listening for comprehension

Listen to the report again. Answer the questions true (T), false (F) or not given (NG).

1. The game Pong was chosen because it is recognisable around the world and easy to understand. _____
2. The study involved human and mice brains, which competed against each other in the same experiments. _____
3. Surprisingly, the mice cells performed better than the human cells. _____
4. Kagan called the mini-brain a "thinking system". _____
5. The team of scientists behind the study came from a number of different countries. _____
6. The researchers hope that the study will aid in tackling health problems in the future. _____
7. No further experiments are planned following the success of the study. _____
8. The DishBrain isn't the first mini-brain to be created. _____

Task 5

Reading: general vocabulary

Part A: Match the words in bold with the correct definitions.

1. The recent **controversy** has caused arguments across the country. (n)
2. Our teacher **assured** us that she would mark our homework in time for Thursday's class. (v)
3. Some experts believe that if robots become **self-aware**, the human species will come to an end. (adj.)
4. Scientific experiments often deal with **ethical** questions, especially when medicine is given to one group of people but not to the other. (adj.)
5. I **developed** problems with my eyesight as a teenager, and have been wearing glasses ever since. (v)
6. Animals may **perceive** reality differently from human beings. (v)
7. The school called my parents as they had some **concerns** about my grades, and my mother ended up telling them about my health problems. (n)
8. **Advances** in technology have made it much easier to keep in touch with family members in other countries. (n)

a. connected with beliefs and principles about what is right and wrong

b. knowledge and understanding of yourself

c. begin to have something such as a disease or a problem

d. tell somebody that something is definitely true or is definitely going to happen, especially when they have doubts about it

e. notice something or someone by using sight, sound, touch, taste or smell

f. a feeling of worry, especially one that is shared by many people

g. public discussion and argument about something that many people strongly disagree about, think is bad or are shocked by

h. progress or a development in a particular activity or area of understanding

Part B: Complete the dialogue below with the words and phrases from the above exercise. You may need to change the tense of the word or phrase. After completing the dialogue, read it out with a partner, focusing on pronouncing the key vocabulary correctly.

Janet: What do you think about the _____[1] around the mini-brain story?

Ruth: I can understand some of the _____[2], but as a scientist, I think we should focus on the scientific _____[3] that this sort of study could make possible, don't you?

Janet: I knew you'd say that! I just find some of the _____[4] questions this sort of thing raises a little worrying. I mean, how do we know if these brain cells are _____[5] or not? Imagine if they were!

Ruth: I don't think that's possible, really. We're talking about a tiny number of cells. I can _____[6] you they wouldn't be able to _____[7] reality, if that's what you're thinking!

Janet: Can we know that for sure, though?

Ruth: I think you're missing the point. The researchers want to prevent people from _____[8] disorders, and this kind of study could help us to understand these kinds of conditions.

Janet: By teaching brain cells how to play a video game? I think there are better ways of helping, personally!

Part C: Discuss these questions in pairs.

1. Can you think of any other recent scientific studies which have caused **controversy**?
2. What kind of **ethical** questions does the mini-brain study raise?
3. Do you think that robots will ever become **self-aware**?
4. Have you **developed** any health problems that you didn't have when you were a young child?
5. Do you think that **advances** in science may, one day, prevent humans from dying of old age?
6. Do you believe that dogs and cats **perceive** reality differently from human beings?
7. Which global **concerns** are you most worried about at the moment?

Task 6

Pre-reading task: reading for general understanding

You are going to read a text about people's opinions on a scientific study using brain cells. Scan the text quickly and match the profession with the correct speaker. One profession cannot be matched to any of the four speakers in the text and should be marked *Not given*.

Bradley **Daisy** **Jay** **Miranda** **Not given**

1. Medical student: _____
2. Game designer: _____
3. Psychologist: _____
4. Dentist: _____
5. Biologist: _____

Brains in a dish

Four people share their thoughts on the study

A. Miranda, 37

As a biologist, I'm optimistic. These sorts of news stories often attract controversy, but I believe that there is usually an element of misunderstanding, with the media and the public perhaps jumping to the wrong conclusions. Admittedly, it doesn't help when scientists throw around words like "sentient" to describe a collection of cells. In the last few days I've read a few articles worrying about the ethical side of things, but I can assure you that the cells are not aware, and that any mini-brain created with current technology is not alive in the sense of you or I. I've also come across some interesting papers on the future of genetics. Some of my peers believe that mini-brains could well be a cure for all kinds of conditions in the next few decades. Of course, we need more data, but this latest study is very promising indeed.

B. Bradley, 35

It's terrifying. I've heard that, in philosophy, there's this theory called "brain in a vat", which is basically the idea that if you were just a brain inside a glass jar in a lab, you could never know if reality was real or not. So, you might think that you were walking but you're actually just a brain that is dreaming, or connected to a computer. I think that's really horrible, the idea that the things we think are real might not be. Now, scientists have developed these mini-brains that can, apparently, play video games. We are assured that they cannot really think, that they're not really alive, as such, but what if they are actually self-aware? Even us psychologists don't really understand the brain, not completely, and I think it's dangerous and morally wrong to try to create lab-grown versions of this complex thinking machine.

C. Jay, 22

I lost my grandfather to a genetic condition a few years ago. Since it's passed down through genes, there's a chance I may develop it too. If we could somehow prevent these conditions from existing, or cure them completely, I think we should do anything in our power to achieve that. Sure, the idea of a brain-in-a-dish is a little strange, but so is the idea of organ donation, if you think about it. Most scientific advances have caused a little bit of concern in the early days, especially from people worrying about whether it's right or wrong. I don't think it's right to let people become ill or die if we can prevent it. I'm studying to be a doctor at the moment, although sometimes I wish I had chosen biology instead. Hopefully, one day in the near future, genetic conditions and diseases will belong in the history books – thanks, in part, to the mini-brains that learnt how to play Pong.

D. Daisy, 62

Well, I don't really understand how the study worked, and I've never played this 'Pong' game, but I did play tennis as a child. I was rather good! Although I went into dentistry, I kept playing every now and then. My daughter has a tennis video game, with a device that you put around your eyes to make it seem as if you're really playing. I hated it! I missed the smell of the trees, the sound of birds and the squeak of an old trainer on the grass. It just wasn't tennis. I wonder how these "mini-brains" as they call them perceive the game they've been made to play. They have nothing to compare it to, I suppose! I don't know enough about the subject to offer an educated opinion, but I can't help but feel that it is wrong to try to create a brain – mini or otherwise – in a laboratory.

Task 7

Reading comprehension

Part A: Read the article again. Match statements with the correct speakers. Some statements can be matched to more than one speaker. One of the statements cannot be matched to any of the speakers and should be marked Not given.

1. They think that it is wrong to create a mini-brain in a laboratory. _____
2. They believe that the study was wrong from a religious point of view. _____
3. They think that mini-brains could help to cure genetic conditions. _____
4. They think that scientific studies are often presented badly by the media. _____

Part B: For each question, choose the answer you believe best suits the speaker.

1. Why does Miranda not like the word "sentient"?
   a. She thinks that it could give the wrong impression to the public and the media.
   b. She mentions a different term that would be more suitable for the mini-brain.
   c. She doesn't believe any life form is sentient other than a fully developed human being.
2. Why does Bradley think the "brain in the vat" idea is terrifying?
   a. He doesn't like the idea that somebody else might be controlling what he sees and thinks.
   b. The idea goes against his religious views.
   c. He doesn't like the idea that things we believe to be real might not be.
3. Why might Jay think that we should ignore ethical concerns about mini-brains?
   a. He believes that mini-brains are the only way to treat genetic conditions.
   b. He thinks that it's just the same as organ donation.
   c. He thinks that we should do anything we can to prevent people from becoming ill or dying from genetic conditions.
4. Why didn't Daisy enjoy the tennis-themed video game her daughter owns?
   a. The device that she used gave her a headache.
   b. She missed the smells, sights and sounds of playing real tennis.
   c. She thought it was too realistic.

Task 8

Reading: expressions and phrasal verbs

Part A: Using the text above for reference, complete the definitions of the expressions and phrasal verbs below by filling in the gaps with the correct words from the list.

alive find quickly time

1. **jump to conclusions:** to make a decision about somebody/something too _____, before you know or have thought about all the facts
2. **every now and then:** from _____ to time; occasionally
3. **to come across somebody/something:** to meet or _____ somebody/something by chance
4. **to pass something down:** to teach or give something to someone who will be _____ after you have died

Part B: Complete the sentences with one or two correct expressions or phrasal verbs from Part A. You may need to change the form of the expression or phrasal verb.

1. Many surnames in the United Kingdom are _____ from father to son.
2. I'm glad I didn't _____ – it turned out my colleague hadn't stolen my watch after all; I'd just lost it.
3. I like to walk home from work _____, although I usually take the car.
4. I _____ this interesting book last week. I went back to the bookshop to buy it the next day, but it was gone.

Task 9

Reading: general vocabulary

Part A: Match the words in bold with the correct definitions.

1. If machines gain **sentience**, it could change the course of human history. (n)
2. The police said that the politician's papers had been **falsified**, and that he was working for a foreign government. (v)
3. The **buzz** of the crowd came to a sudden end when the band walked onto the stage. (adj.)
4. I left my role as a priest ten years ago – I became more interested in the **corporeal** world, and lost my faith entirely. (adj.)
5. The Prime Minister claimed to **empathise** with those of us who had lost our jobs, but I didn't believe him. (v)
6. Animals may have a different **perception** of reality than human beings. (n)
7. When trying to give up smoking, it's important to resist the **temptation** to have a single cigarette, as one can lead to many more. (n)
8. According to my father, the **protagonist** in his latest novel was based on my older brother. (n)
9. The videos appeared to be real, but were in fact **fabricated** in order to trick voters. (v)
10. If nothing is done about climate change, we will all be **at the mercy of** extreme weather in coming years. (idiom)

a. invent or produce something false in order to deceive someone
b. that can be touched; physical rather than spiritual
c. to change something, such as a document, in order to deceive people
d. understand another person's feelings and experiences, especially because you have been in a similar situation
e. the way in which you notice things, especially with the senses
f. the quality of being able to experience feelings
g. not able to stop somebody/something harming you or affecting you negatively because they have power or control over you
h. a continuous sound, such as that made by an electronic device or the sound of people talking in an excited way
i. the main character in a book, film or play
j. the desire to do something, especially something wrong or unwise

Part B: Complete the short text below with the words and phrases from the above exercise. You may need to change the tense of the word or phrase.

My colleagues and I are hoping, one day, to be able to produce an artificial brain that is capable of achieving _____[1]. I suppose the desire to _____[2] emotions in a machine comes from my childhood – I lost my parents at a young age, and ended up _____[3] the state. Throughout my life I have had difficulties expressing myself emotionally. I've always felt like my _____[4] of the world is a little different from that of other people. Some years ago, I saw a film about a robot that learnt how to think and feel like a human. The robot was the _____[5] of the movie, despite being a machine, and I actually _____[6] with it in a strange way. After watching the film, I called some friends and, a year later, we founded our company with the intention of creating a robot brain which, although it exists in the _____[7] world, is aware of non-physical concepts. We've had a few problems – we lost a lot of money in our first year, and in the second, one of our scientists apparently _____[8] his qualifications, and didn't know what he was doing at all. However, myself and my co-workers resisted the _____[9] to close down the company and kept going. Last week we presented our first robot brain to a live audience. The _____[10] of the crowd made it all worth it. Everybody was so excited!

Part C: Discuss these questions in pairs.

1. Do you believe that **sentience** exists in any non-human animals?
2. Can you think of a **protagonist** in a film or book that you disliked?
3. In general, do you try to **empathise** with other people?
4. Do you feel that we are **at the mercy of** our planet?
5. Does the constant **buzz** of noise in cities annoy you, or are you used to it?
6. If a politician is found to have **falsified** important documents, should they be sent to prison?
7. Do you think that, in general, our **perception** of reality is different to how people perceived the world 50 years ago?

Task 10

Pre-reading task: reading for general understanding

You are going to read a text about our perception of reality. Scan the text quickly and match the headings with the correct paragraphs. One heading cannot be matched to any of the paragraphs in the text and should be marked *Not given*.

1. An internal reality → _____
2. The age of distraction → _____
3. A question for the ages → _____
4. Making brain experiments illegal → _____
5. Technology brings new problems → _____

Perceiving reality

Can we ever be sure that the world around us is real?

1. How can we know that reality is real? This may seem like a foolish question – after all, if we can see something, or touch it, it must exist. As The Matrix pointed out, however, the sensory information our brains receive is just electronic signals – signals which could be fabricated with the right technology. We could, in fact, be brains floating in jars, connected via electrodes to a powerful computer that simulates everything we see, hear and believe to be real. This thought experiment – created by Gilbert Harman – builds on philosophical ideas dating back to Descartes, and it is likely that human beings have questioned the nature of their reality long into the past. After all, we can dream, and know, upon waking, that the dream was not real, and yet during the dream we aren't so certain. If we can deceive ourselves each night, how can we be sure that all of our experiences haven't been falsified?

2. Technological advances serve to further complicate these philosophical ponderings. First, we began to develop artificial intelligence, and now we're moving on to bioengineering. In the not-so-distant future, we may be capable of identifying consciousness or even replicating sentience. For now, though, our inventions are at the mercy of ethical considerations. If we cannot be sure about the true nature of consciousness, is it irresponsible to create artificial brains, whether they are mechanical or biological? How can we be sure, when growing brain cells in a laboratory, that they are not experiencing reality on some level? We have no means of communicating with them, and even if we did, would we be able to empathise with them? Perhaps there would be a temptation to perceive mini-brains as lesser, even if they were capable of thought or emotion.

3. The way we consider other beings – whether human or non-human – helps to create our own image of ourselves, and to inform our perception of reality. Some philosophers have suggested that we can only prove that we ourselves are real; that all external beings are, potentially, products of our imagination. This school of thought, which is known as solipsism, has led to fierce debates within intellectual communities. In some ways, it is the opposite of the brain-in-the-vat theory, focusing on the internal rather than the external. Critics have pointed out that this way of thinking could be somewhat dangerous, with the implication that, if others are not real, their lives do not matter. Nonetheless, solipsism has made its way into popular culture, with the concept of "main character syndrome" emerging in recent years. The term, popularised on TikTok, refers to the idea that you are the protagonist in your life story, with friends, family members and acquaintances taking on the roles of extras.

4. The true nature of reality is likely to remain unknown to us, at least for now. We are, however, changing our ideas about what is real and what isn't – and what matters and what doesn't. The story of our time is one of distraction, with virtual realities, online worlds and the constant buzz of notifications keeping us one step removed from the corporeal world. Through screens big and small, we spend many of our waking hours trying to escape reality in one way or another. Our new way of life has led to interesting debates: do the things you do in an online game matter? Is a world that has been constructed artificially just as valid as the one we were born into? How would we react if the Internet was turned off tomorrow? With the planet heating up and wars breaking out, perhaps confronting the real world – and acting – is a better choice than attempting to hide from it.

Sources: BBC, The Guardian, YouTube, UCL

Task 11

Reading comprehension

Read the article again. Complete the sentences with between one to three words from the article.

1. Using technology, it could be possible to fabricate the _____ that translate to information in our brains.
2. A _____ developed by Gilbert Harman suggests that we may be brains floating in jars, connected to computers that generate our reality.
3. How can we be sure about our perception of reality, given that we _____ ourselves every time we dream?
4. Such philosophical questions are further complicated by recent _____.
5. With no way of communicating with mini-brains, can we be sure that they are incapable of _____ reality on some level?
6. Our perception of reality may be informed by the way in which we _____, be they human or non-human.
7. According to the philosophy of solipsism, all _____ beings are, at least potentially, products of our imagination.
8. Modern interpretations of solipsism include _____, an idea popularised on TikTok.
9. Although the true nature of reality remains unknown to us, our ideas about what is real and what isn't are _____.
10. Rather than attempting to escape reality, perhaps it is best to confront the _____.

Task 12

Talking Point

In pairs or small groups, discuss the following questions.

1. Do you think that creating mini-brains is wrong? Why/why not?
2. Do you believe Kagan's claim that the mini-brain is sentient?
3. Are there some areas of science that could be dangerous to explore?
4. Do you think it's okay to experiment on animals or lab-created human body parts if it helps us to treat diseases and disorders in the future?
5. Do you think it's possible that you are a "brain in a vat" and that what you believe to be reality isn't real?
6. In the 21st century. do we spend too much time trying to escape from reality?
7. Will we ever be able to truly understand the human brain?
8. Why do you think some people are attracted to the idea of solipsism? Does it appeal to you? Why/why not?

Task 13

Extended activity/writing homework

Write an opinion essay on one of the topics below. Your essay should agree with or disagree with the statement and should be between 260 – 320 words.

1. The creation of mini-brains raises too many ethical questions. Scientists banned from experimenting with human brain cells.
2. The best our species can hope for is that, one day, we will develop a simulated reality that improves upon the real world in every way possible.

Alternative extended activity

In two groups, debate the following statement:

> "We should do whatever it takes to treat genetic disorders, so that, in the future, people no longer get ill or die from problems that are passed down through genes."

One group should argue FOR the statement, with the other group arguing AGAINST. Before your debate, each group should work together to make a list of ideas to support their argument.