ENGLISH LEARNING FOR CURIOUS MINDS



Episode #174
3D Printing
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Transcript

[00:00:00] Hello, hello hello, and welcome to English Learning for Curious Minds, by Leonardo English.

[00:00:12] The show where you can listen to fascinating stories, and learn weird and wonderful things about the world at the same time as improving your English.

[00:00:22] I'm Alastair Budge and today we are going to be talking about 3D printing.

[00:00:29] It has been **hailed**[1] as the technology that will **usher in**[2] a Fourth Industrial Revolution, will help take humans to Mars, help us live longer, happier lives, and **revolutionise**[3] manufacturing.

[00:00:43] But people have been saying this for quite some time now, and the technology is actually a lot older than you might think.

[00:00:52] So, in today's episode we are going to talk about how 3D printing actually works, what people think it will allow us to do, some of the fears that people have about 3D printing, and discuss how, if at all, it will change the world we live in.

[00:01:10] I should say that this episode is a member request, it's from an awesome member of Leonardo English, a guy from the Czech Republic called Jachym.

[1] publicly praised

[2] bring about the start of

[3] change in a very big and basic way

[00:01:19] So, Jachym, I hope you enjoy this episode.

[00:01:23] And if you want to be a bit more like Jachym, and do things like request episodes, listen to all of our bonus episodes, plus follow along with the subtitles, transcript and key vocabulary, then I would love for you to check out becoming a member of Leonardo English.

[00:01:40] Membership of Leonardo English gives you access to all of our learning materials, and will help you improve your English in a faster, more enjoyable, and most importantly, more interesting way.

[00:01:53] So, if that sounds like fun then the place to go to is leonardoenglish.com.

[00:02:01] Right, 3D printing.

[00:02:05] One of the main differences between humans and animals is that we make things.

[00:02:10] We create tools from the natural world to help us do things.

[00:02:16] From a caveman making an **axe**[4] out of some wood and stone right through to the creation of the phone or computer that you are listening to this episode on, humans make things.

[4] a tool with a heavy, sharp blade on a long handle, used for cutting wood

[00:02:27] An animal might make a **nest**[5], it might dig a hole to create a house, but the creation of objects is something that's relatively **unique**[6] to us, that's **unique** to human beings.

[00:02:41] To state the obvious, as time has gone on, and technology has developed, each generation has got better and better at producing objects.

[00:02:51] 3D printing, to its **proponents**[7], to its greatest fans, is the most advanced and important manufacturing technology that currently exists.

[00:03:02] It allows anyone, anywhere, with the right machine, to produce **custom-built**[8] objects, in a huge variety of different materials.

[00:03:13] So, how does it actually work, and why is this important?

[00:03:19] One way of thinking about the actual 3D printing process is that it is the opposite of traditional or classic manufacturing.

[00:03:29] Think of traditional manufacturing like **sculpture**[9], **carving**[10] an object out of a piece of stone or **marble**[11].

[5] a home that birds and some other animals build from sticks, grass or mud

[6] belonging only

[7] people who support and argue for something

[8] made specially to suit one person's needs

[9] the art of making figures or shapes out of stone, wood or metal; a figure made in this way

[10] cutting and shaping

[11] a hard, smooth stone often used for statues and buildings

[00:03:37] There is a block of material, and you cut pieces away until you are left with the object that you want.

[00:03:46] If we continue with the example of a **sculpture**, let's take Michelangelo's David, for example, this was **carved**[12] out of a large piece of **marble**, it was **smoothed**[13] and **sanded**[14] until what remained was the form of David that we see today.

[00:04:03] 3D printing is the opposite.

[00:04:05] You start with nothing, and **matter**[15] is added and added until the **desired**[16] shape, or object, is created.

[00:04:14] To call it printing is actually a little bit **deceptive**[17].

[00:04:20] To the **uninitiated**[18], to those who don't know huge amounts about it, it makes you think of a printer.

[00:04:28] There are some shared concepts between 3D printing and traditional printing, but it's probably more useful to think about the "printing" in 3D printing as building, creating, or simply "making".

[12] cut and shaped
[13] rubbed or worked until it had no rough parts
[14] rubbed with rough paper to make the surface even
[15] physical material
[16] wanted or chosen
[17] misleading; giving the wrong idea
[18] people who have no special knowledge of a subject

[00:04:46] Indeed the technical term for 3D printing is Additive Manufacturing - manufacturing by adding, rather than taking away.

[00:04:56] Although you might have seen headlines and news programmes in the last 10 years or so about the huge impact that 3D printing is going to have, the technology has actually been around since the 1980s.

[00:05:12] Early versions of 3D printing were similar to typical 2D printing at a **conceptual**[19] level.

[00:05:20] If you are printing a document or a photo, there is a computer record of the text or image to be printed, then the printer adds ink to the paper in the right places, and ta-da, you have a printed document.

[00:05:35] Early 3D printing worked in a similar way.

[00:05:38] You would create your computer file in 3D of the object to be printed.

[00:05:45] But the 3D printer didn't just go across the page at one level, it added **matter** vertically, so that gradually an object could be created from nothing.

[00:05:58] Although this was **groundbreaking**[20] technology, in its early days it was too expensive and slow to be practical for **widespread**[21] use.

[19] relating to the basic idea of how something works

[20] completely new and very important

[21] happening in many places or among many people

[00:06:08] As one might expect, the technology continued to be improved and improved, and new forms of 3D printing would be created, and **patented**[22], they would be protected by a **patent**[23], a legal device to prevent others from copying it.

[00:06:25] As you may know, and you are probably extra familiar with this if you have listened to the episode on **patents**[24], **patents** all have a fixed term, they don't last forever.

[00:06:37] This gives the inventor the opportunity to benefit from a **time-limited**[25] monopoly on it, but they have to provide clear instructions for others on how to **replicate**[26] the technology.

[00:06:51] Now, coming back to 3D printing, having a **patent** meant that the inventor of a particularly **sophisticated**[27] 3D printing technique could charge higher prices for people to use their machines.

[00:07:06] In the 2000s, even though 3D printing objects could be very expensive, for some use cases it was still cheaper than traditional manufacturing.

[22] officially registered so that only the inventor could make or sell them

[23] an official legal right to be the only one who can make or sell an invention

[24] official legal rights to be the only ones who can make or sell inventions

[25] lasting only for a fixed period

[26] copy or make again in exactly the same way

[27] advanced and complicated

[00:07:17] For example, one of the earliest obvious uses of 3D printing is for **prototyping**[28], for building a version one, a test version, of a product.

[00:07:30] With traditional manufacturing, you need to find a factory to build it. This factory needs to have expensive machinery, which needs to either be built or **calibrated**[29], and the entire process takes a long time and is expensive if you only want to build one **unit**[30], if you only want to make something once.

[00:07:52] With 3D printing, you can do this very quickly, and even with what we would now consider to be very high costs of 3D printing, it could still be more cost effective than traditional manufacturing.

[00:08:06] But, in 2009 the **patent** for the most advanced 3D printing technique, called fused deposition modeling expired.

[00:08:16] These machines used to cost around $10,000 to buy, but almost **overnight**[31] the price dropped to around $1,000.

[00:08:27] Still, not cheap, and not the sort of thing that anyone would buy to use at home, but a significant **reduction**[32].

[00:08:36] This not only meant that using 3D printing technology became a lot cheaper, but it also opened up the market to **hobbyists**[33], to people who wanted to 3D print objects for fun or for personal curiosity.

[28] making early test versions of a product

[00:08:52] Suddenly, there was **renewed**[34] interest in the technology, and it became more accessible to companies of all sizes, across a huge variety of industries.

[00:09:04] Let's talk through some of the examples of how it was used.

[00:09:08] Firstly, let's continue with manufacturing, as this is the **sector**[35] for which 3D printing is most exciting.

[00:09:16] For **prototyping**, a company could now buy their own 3D printer, and rapidly **iterate**[36] on products, they could improve something continuously over a short period of time.

[00:09:30] An engineer could design a new product, and the next day a version of it could be produced, it could go from idea, to software, to physical product in a tiny amount of time compared to the **status quo**[37], to the normal way of doing it.

[00:09:48] It's also thought that 3D printing will completely **revolutionise** the global manufacturing **supply chain**[38].

[29] carefully adjusted so that it works correctly

[30] single item of a product

[31] very suddenly; in a very short time

[32] fall or decrease

[33] people who do an activity for fun in their free time

[34] returning again after a pause

[35] an area of business or of the economy

[36] make repeated small changes and improvements

[37] the way things are at the moment

[38] the series of businesses and steps involved in making a product and getting it to customers

[00:09:56] If we take the example of a British car manufacturer, it currently buys parts for its cars from different factories all over the world.

[00:10:06] Perhaps a factory in China makes the **windscreen wipers**[39], a factory in Brazil might make the seat belts, a factory in Germany might produce the electrical wires, an Italian factory might produce the **brakes**[40].

[00:10:21] Our economy has developed in this way, so that factories, or indeed entire companies, **specialise**[41] in making just one or two **components**[42], which they ship all over the world.

[00:10:34] There are even entire cities in China which **specialise** in producing only one product, there's cigarette lighter city, condom city, and so on.

[00:10:45] The economics of this currently make sense, and with our example of the British car company, it is cheaper for it to buy all of these parts from all over the world, and they are shipped to the factory where they are put together.

[00:11:01] For this car company to build its own factories to make all of the unique parts would be incredibly expensive, and so it doesn't make sense for it to do it.

[00:11:12] But, what if it could 3D print these parts closer to home?

[39] the moving arms that clear rain from the front window of a car

[40] the parts of a car used to slow it down or stop it

[41] concentrate their work

[42] parts used to make a bigger machine or product

[00:11:17] What if the cost to 3D print the parts was so low that it made no sense to buy them from the other side of the world?

[00:11:27] 3D printing isn't quite there yet, but it is currently at the level where if a company needs only a few units, it can print them itself, rather than having to order hundreds of thousands of them from the other side of the world.

[00:11:43] Obviously, when 3D printing does become cheaper than buying a product from a factory on the other side of the world, this will have huge **implications**[43] for global trade.

[00:11:53] Producing goods closer to home means less transport, fewer **emissions**[44], and a complete **rethinking**[45] of the global trade system that we currently live with.

[00:12:04] 3D printing also means you can produce a much greater variety of products.

[00:12:11] There are some shapes and forms that are just very difficult to produce using traditional manufacturing processes, given that you have to cut, or **bend**[46], or fix things together.

[00:12:24] Due to the fact that with 3D printing you are literally creating a shape from nothing, you can make practically anything.

[43] possible effects or results

[44] harmful gases sent into the air

[45] fresh consideration and redesign

[46] change the shape of something by making it curved

[00:12:34] And when it comes to what you can make, 3D printing isn't only about making quicker **prototypes**[47] or a greater variety of products.

[00:12:44] It's also already meaning that we can "print", **in inverted commas**[48], print things that we couldn't previously do.

[00:12:53] It's now possible to print or make human body parts.

[00:12:58] Whether it's an ear or a part of an **organ**[49], the technology now allows us to take **cells**[50] and literally create new body parts.

[00:13:08] There is always a **mismatch**[51], a **disparity**[52], between the number of people who need new body parts and the number of available body parts, and **advocates**[53] of 3D printing suggest that the technology will allow us to close this gap.

[00:13:24] Need a new **tube**[54] going into your heart? No problem, we can print one for you.

[00:13:29] It would certainly **revolutionise** global healthcare.

[47] early test versions of a product

[48] used to show that a word is not being used in its usual or exact sense

[49] a part of the body with a special job, such as the heart or liver

[50] the tiny basic parts that all living things are made of

[51] a gap or lack of balance

[52] a big difference

[53] people who publicly support something

[54] a long, hollow pipe, such as one that carries blood

[00:13:33] And, moving further afield, out of this world even, 3D printing is a technology that is already playing an important role in space exploration.

[00:13:44] At the moment, everything that is taken into space is manufactured on Earth and shot up into space.

[00:13:52] A spacecraft needs to take everything it needs with it, because there obviously isn't an easy way to get a new piece of equipment when you are circling the Earth.

[00:14:04] But, with a 3D printer, you can literally make any object you need, you can use that object, and when you no longer need it you can **melt**[55] the material down and create something else.

[00:14:17] Amazing, right?

[00:14:19] And it's not just for making **spare**[56] parts on spaceships.

[00:14:23] It is thought that 3D printing will play a very important role in a human **settlement**[57] on Mars.

[55] make a solid soft or liquid by heating it

[56] extra, kept to replace ones that break

[57] a place where people come to live and make their home

[00:14:31] These **settlements**[58] would have to be created somehow, and it isn't **feasible**[59] to shoot up an entire **pre-built**[60] **settlement** and fly it to Mars.

[00:14:42] Instead, so the theory goes, 3D printers would be used to create new **settlements** directly on Mars.

[00:14:51] So, how is 3D printing going to affect you and me, **assuming**[61] that we are unlikely to be personally **colonising**[62] Mars?

[00:15:00] Will we literally be able to print anything we want?

[00:15:04] Will we all have machines in our houses and we can press a button to create a cup, a new ear, or even a full English breakfast?

[00:15:13] Now, let's actually take these three examples first, because they are all important in their own different ways.

[00:15:20] It is already possible to buy a 3D printer, the cheapest ones start at around €100 nowadays, so it is not completely **inconceivable**[63] that you could have one in your house.

[00:15:34] You could certainly print a cup, that's an easy one.

[58] places where people come to live and make their homes
[59] possible or practical
[60] made beforehand
[61] accepting as true
[62] going to live in and take control of a new place
[63] impossible to imagine

[00:15:37] It's also possible to print a new ear, although that obviously requires some pretty complex medical knowledge as well, and your €100 3D printer probably wouldn't be up to the challenge.

[00:15:51] And in terms of printing yourself a full English breakfast, or creating food out of nothing, this has been a theme that has interested science fiction writers for years.

[00:16:03] If you are a Star Trek fan you will be familiar with a device called The Replicator, which was similar to a microwave oven, but could create objects from nothing.

[00:16:14] There are several companies that are already working on 3D printing meat, and the first 3D printed steak is set to appear on dinner plates at certain European restaurants by the end of 2021.

[00:16:28] The comparison might sound a little **disgusting**[64], but the process is similar to that of creating a human ear. You take a **sample**[65] of the **tissue**[66], and from that you can create a **replica**[67] of the original.

[00:16:43] I couldn't find an example of any company that is focussing on 3D printing full English breakfasts, but there is no reason that the technology shouldn't be possible in the future.

[64] unpleasant and off-putting

[65] a small amount taken to be tested or used

[66] the material that the bodies of people and animals are made of, such as muscle

[67] an exact copy

[00:16:55] Now, as with anything new, there are the usual fears about what this might lead to.

[00:17:01] If anyone can create anything for themselves, what sort of dangerous **implications** will there be?

[00:17:08] The most commonly **cited**[68] example of this with 3D printing is of people printing their own guns.

[00:17:16] It is very possible to 3D print a gun, and these guns can often be hard to **detect**[69].

[00:17:24] Indeed, an Israeli journalist demonstrated this in 2013 by 3D printing a gun, going to a press conference with Benjamin Netanyahu, the Israeli Prime Minister, where he managed to take the gun through the metal detector without it **beeping**[70].

[00:17:43] In the video of the event you can see the journalist holding the gun and secretly pointing it at Netanyahu. It would have been very easy for him to stand up, fire the gun and kill him.

[00:17:57] Netanyahu criticised this as an "an **irresponsible**[71] act", but 3D printing certainly does **pose**[72] some security problems.

[68] mentioned or referred to

[69] notice or find

[70] making a short, high electronic sound

[71] careless and likely to cause harm

[72] create or cause

[00:18:06] In most countries in the world, apart from the one very obvious exception, gun ownership is very **tightly**[73] **regulated**[74], and the idea that anyone, anywhere could get their hands on a gun is something that most governments haven't had to properly **confront**[75] yet.

[00:18:24] But to think that people are going to start printing guns and shooting people just because they now have a 3D printer seems a little bit **unrealistic**[76].

[00:18:34] If you are **intent**[77] on killing someone then I'm sure you can find a way without a 3D printer.

[00:18:42] And there is the familiar **critique**[78] of any new technology, that it is going to take jobs from humans.

[00:18:50] If we no longer need large factories with humans **manning**[79] the equipment to produce the parts, or humans **assembling**[80] the parts, this will cause these people to lose their jobs, so the argument goes.

[73] strictly
[74] controlled by rules and laws
[75] deal with a difficult problem directly
[76] not sensible; unlikely to happen
[77] very determined
[78] an argument that points out the faults in something
[79] working and operating
[80] putting together

[00:19:03] Of course these machines will replace the jobs of humans, that's the entire point.

[00:19:08] The job of any machine is to reduce the work of a human, whether it's a fishing net or a 3D printer, the reason for creating machines is to reduce the amount of work a human needs to do.

[00:19:23] But to criticise 3D printing, or to **legislate**[81] against it because it will lead to some job losses in the manufacturing **sector** is pretty **shortsighted**[82], and is comparable to regulating against driverless cars because they will put truck drivers out of work.

[00:19:41] This is such a familiar criticism of any new technology, and the economic system has a pretty good **track record**[83] of creating new jobs to replace the old ones.

[00:19:52] Now, even though 3D printing as a technology has been around for over 40 years now, it is just getting started. It was worth around $14 billion dollars in 2020, and is **predicted**[84] to grow at around 21% every year.

[00:20:10] Right now most of us probably don't see the impact that it is having, but **behind the scenes**[85], in healthcare, manufacturing, space travel, and multiple other

[81] make laws

[82] not thinking about what will happen in the future

[83] history of past results and successes

[84] expected

[85] in ways that most people do not see

industries, it is helping us build products more quickly, more cheaply, and more **efficiently**[86].

[00:20:28] Only time will tell when the day will come when we can print our own full English breakfasts.

[00:20:36] OK then, that is it for the magical technology of 3D printing. It might have got off to a slow start, but it is playing an ever greater role in the world we live in.

[00:20:49] As always, I would love to know what you thought of this episode.

[00:20:53] Have you ever 3D printed anything? What would you think about eating a 3D printed steak, or having something that was 3D printed **transplanted**[87] into your body?

[00:21:04] I would love to know.

[00:21:06] For the members among you, you can head to our community forum, over at community.leonardoenglish.com and get chatting away to other curious minds.

[00:21:16] And as a final reminder, if you enjoyed this episode, and you are wondering where to get all of our bonus episodes, plus the transcripts, subtitles, and key vocabulary, then the place to go to for all of that is leonardoenglish.com.

[86] without wasting time, money or energy

[87] placed by a medical operation

[00:21:31] I am on a mission to make Leonardo English the most interesting way of improving your English, and I would love for you to join me, and curious minds from 50 different countries, on that journey.

[00:21:44] The place you can go to for all of that is leonardoenglish.com. You've been listening to English Learning for Curious Minds, by Leonardo English.

[00:21:54] I'm Alastair Budge, you stay safe, and I'll catch you in the next episode.

[END OF EPISODE]

Key vocabulary

Word	Definition
Hailed	publicly praised
Usher in	bring about the start of
Revolutionise	change in a very big and basic way
Axe	a tool with a heavy, sharp blade on a long handle, used for cutting wood
Nest	a home that birds and some other animals build from sticks, grass or mud
Unique	belonging only
Proponents	people who support and argue for something
Custom-built	made specially to suit one person's needs
Sculpture	the art of making figures or shapes out of stone, wood or metal; a figure made in this way

Carving	cutting and shaping
Marble	a hard, smooth stone often used for statues and buildings
Carved	cut and shaped
Smoothed	rubbed or worked until it had no rough parts
Sanded	rubbed with rough paper to make the surface even
Matter	physical material
Desired	wanted or chosen
Deceptive	misleading; giving the wrong idea
Uninitiated	people who have no special knowledge of a subject
Conceptual	relating to the basic idea of how something works
Groundbreaking	completely new and very important
Widespread	happening in many places or among many people

Patented	officially registered so that only the inventor could make or sell them
Patent	an official legal right to be the only one who can make or sell an invention
Patents	official legal rights to be the only ones who can make or sell inventions
Time-limited	lasting only for a fixed period
Replicate	copy or make again in exactly the same way
Sophisticated	advanced and complicated
Prototyping	making early test versions of a product
Calibrated	carefully adjusted so that it works correctly
Unit	single item of a product
Overnight	very suddenly; in a very short time
Reduction	fall or decrease
Hobbyists	people who do an activity for fun in their free time

Renewed	returning again after a pause
Sector	an area of business or of the economy
Iterate	make repeated small changes and improvements
Status quo	the way things are at the moment
Supply chain	the series of businesses and steps involved in making a product and getting it to customers
Windscreen wipers	the moving arms that clear rain from the front window of a car
Brakes	the parts of a car used to slow it down or stop it
Specialise	concentrate their work
Components	parts used to make a bigger machine or product
Implications	possible effects or results
Emissions	harmful gases sent into the air

Rethinking	fresh consideration and redesign
Bend	change the shape of something by making it curved
Prototypes	early test versions of a product
In inverted commas	used to show that a word is not being used in its usual or exact sense
Organ	a part of the body with a special job, such as the heart or liver
Cells	the tiny basic parts that all living things are made of
Mismatch	a gap or lack of balance
Disparity	a big difference
Advocates	people who publicly support something
Tube	a long, hollow pipe, such as one that carries blood
Melt	make a solid soft or liquid by heating it

Spare	extra, kept to replace ones that break
Settlement	a place where people come to live and make their home
Settlements	places where people come to live and make their homes
Feasible	possible or practical
Pre-built	made beforehand
Assuming	accepting as true
Colonising	going to live in and take control of a new place
Inconceivable	impossible to imagine
Disgusting	unpleasant and off-putting
Sample	a small amount taken to be tested or used
Tissue	the material that the bodies of people and animals are made of, such as muscle
Replica	an exact copy

Cited	mentioned or referred to
Detect	notice or find
Beeping	making a short, high electronic sound
Irresponsible	careless and likely to cause harm
Pose	create or cause
Tightly	strictly
Regulated	controlled by rules and laws
Confront	deal with a difficult problem directly
Unrealistic	not sensible; unlikely to happen
Intent	very determined
Critique	an argument that points out the faults in something

Manning	working and operating
Assembling	putting together
Legislate	make laws
Shortsighted	not thinking about what will happen in the future
Track record	history of past results and successes
Predicted	expected
Behind the scenes	in ways that most people do not see
Efficiently	without wasting time, money or energy
Transplanted	placed by a medical operation

Language spotlight

1. Usher in

- **Meaning**: To mark or cause the start of something new, especially an important change or period.
- **Synonyms**: bring in, herald, launch
- **Antonyms**: bring to an end, mark the end of, put a stop to
- **Examples**:
    - The new president promised to **usher in** a period of peace.
    - The invention of the smartphone **ushered in** a new way of communicating.

2. Status quo

- **Meaning**: The existing situation, or the way things are at the moment.
- **Synonyms**: the current situation, the existing state of affairs, the norm
- **Antonyms**: change, reform, upheaval
- **Examples**:
    - Many people are afraid of change and prefer to keep the **status quo**.
    - The new manager wanted to challenge the **status quo** in the office.

3. In inverted commas

- **Meaning**: Used to show that a word is not being used in its normal or exact meaning, or that the speaker does not fully accept it.
- **Synonyms**: so-called, as it were, in quotation marks
- **Antonyms**: literally, in the true sense, in every sense of the word
- **Examples**:
    - He was my 'friend', **in inverted commas**, until he stopped answering my calls.
    - It was a 'relaxing' holiday, **in inverted commas**, because the children never slept.

4. Track record

- **Meaning**: The past achievements or failures of a person or organisation, used to judge how well they are likely to do in the future.
- **Synonyms**: history, past performance, reputation
- **Antonyms**: inexperience, unproven ability, lack of history
- **Examples**:
    - The company has an excellent **track record** of finishing projects on time.
    - With her **track record**, she was the obvious choice to lead the team.

5. Behind the scenes

- **Meaning**: Out of public view, where most people do not see or know what is happening.
- **Synonyms**: in private, out of sight, privately
- **Antonyms**: in public, openly, in plain sight
- **Examples**:
    - Hundreds of people work **behind the scenes** to make a film possible.
    - **Behind the scenes**, the two leaders were already discussing a deal.

Quiz

Listening Comprehension Multiple Choice Questions

1. According to the episode, how is 3D printing the opposite of traditional manufacturing?

a) It uses computers, while traditional manufacturing uses hand tools

b) It builds objects by adding material instead of cutting it away

c) It makes objects from plastic instead of stone or metal

d) It produces many identical copies instead of one object at a time

2. What happened after the patent for fused deposition modelling expired in 2009?

a) Many companies stopped making 3D printers altogether

b) The original inventor applied for a brand new patent

c) Governments began to control who could buy the machines

d) The price of the machines fell from about $10,000 to $1,000

3. Why does the British car company in the example buy its parts from factories all over the world?

a) It is cheaper than building its own factories to make every part

b) British law does not allow car parts to be made in the UK

c) The foreign factories are the only ones that can 3D print parts

d) Its customers prefer cars with parts from many different countries

4. Why is a 3D printer useful on a spacecraft, according to the episode?

a) It lets astronauts print fresh food during long journeys

b) It allows the spacecraft to leave most of its fuel on Earth

c) It can make objects that are needed and later reuse their material

d) It can repair the outside of the spacecraft while it is flying

5. How did an Israeli journalist show one of the dangers of 3D printing in 2013?

a) He printed a gun live on television in front of the Prime Minister

b) He took a printed gun past a metal detector without it being noticed

c) He sold printed guns online to show how easy it was to buy them

d) He fired a printed gun at a press conference to show that it worked

True or False

6. The technology behind 3D printing has existed since the 1980s. (True/False)

7. The technical term for 3D printing is Subtractive Manufacturing. (True/False)

8. There are entire cities in China that specialise in producing only one product. (True/False)

9. The cheapest 3D printers today cost around €1,000. (True/False)

10. The 3D printing industry was worth around $14 billion in 2020. (True/False)

Fill in the Blanks

11. It has been _____ as the technology that will usher in a Fourth Industrial Revolution.

12. It could go from idea, to software, to physical product in a tiny amount of time compared to the status ___, to the normal way of doing it.

13. There is always a mismatch, a _____, between the number of people who need new body parts and the number of available body parts.

14. If you are _____ on killing someone then I'm sure you can find a way without a 3D printer.

15. The economic system has a pretty good track _____ of creating new jobs to replace the old ones.

Vocabulary Practice

16. What does "**proponents**" mean when Alastair describes how some people see 3D printing?

a) People who are worried about something

b) People who support and argue for something

c) People who invented or designed something

d) People who sell and advertise something

17. What does "**deceptive**" mean when Alastair talks about calling it "printing"?

a) Too complicated to explain

b) Old-fashioned and out of date

c) Misleading; giving the wrong idea

d) Exciting and full of promise

18. What does "**feasible**" mean in the sentence about building settlements on Mars?

a) Possible or practical

b) Allowed or legal

c) Popular or wanted

d) Safe or healthy

19. What does "**pose**" mean in "3D printing certainly does pose some security problems"?

a) Solve or remove

b) Hide or cover up

c) Stand still for a photograph

d) Create or cause

20. In the podcast, what does "**shortsighted**" mean when describing laws against 3D printing?

a) Unable to see things that are far away

b) Not thinking about what will happen in the future

c) Too expensive and difficult to put into practice

d) Cruel and unfair to people who make things

Answers

1. b) It builds objects by adding material instead of cutting it away
2. d) The price of the machines fell from about $10,000 to $1,000
3. a) It is cheaper than building its own factories to make every part
4. c) It can make objects that are needed and later reuse their material
5. b) He took a printed gun past a metal detector without it being noticed
6. True
7. False
8. True
9. False
10. True
11. hailed
12. quo
13. disparity
14. intent
15. record
16. b) People who support and argue for something
17. c) Misleading; giving the wrong idea
18. a) Possible or practical

19. d) Create or cause

20. b) Not thinking about what will happen in the future