Handout guidelines

The following is an example handout based on the TED Talk *Robots that fly … and cooperate*, by Vijay Kumar

Watch the TED Talk (https://www.ted.com/talks/vijay_kumar_robots_that_fly_and_cooperate) and study the handout.

Sample Handout – *Robots that fly … and cooperate*

1. ***Vocabulary***

Compile a **basic vocabulary list** of 8-10 words and/or phrases that you find essential to discuss your topic and provide the English definitions at the beginning of the handout (English word/phrase on left, alphabetized; English definition on right). This will help everyone know the basic words to discuss the topic.

Match the following words with their definitions:

English	Definition
__ aereal	1 the total weight that something can lift as it flies
__ autonomous	2 able to move quickly and change position easily
__ unmanned	3 calculate
__ onboard processors	4 computers inside a vehicle
__ sensors	5 equipment that reacts to changes in the outside conditions
__ figure out	_____
__ scaled down	6 in the air
__ agile	7 independent, able to make its own decisions
__ obstacles	8 made smaller
__ payload-carrying capacity	9 manage to control a problem or do something difficult
__ overcome	10 things that get in the way of something
__ in formation	11 together with other vehicles in a fixed pattern
	12 with no people to operate something

2. ***Lead-in/Orientation***

Prepare 2-3 questions that will get the group(s) thinking about your topic.

Work in groups. Discuss what you know about remote control aerial robots, sometimes known as drones. Talk about the following points:

- what they look like
- how they fly
- how they are operated
- how big (or small) they are
- their current applications
- their cost
- any problems associated with them

Give a short presentation (5-7 minutes) on your topic)

3. Comprehension

Prepare 8-10 listening comprehension tasks based on your presentation.

Choose the correct options to make true sentences.

1 The robots that Vijay Kumar is talking about are different from unmanned aerial vehicles because they *are smaller / have* sensors.

2 To make the robot fly straight up, you increase the speed of *two / all four* of the rotors.

3 The computer in each robot sends commands to the motors *600 / 700* times a second.

4 A smaller robot can *fly for longer / turn more quickly*.

5 These robots can be used to *find lost objects / check for danger* in buildings.

6 Controlling the motor *power / movement* of the robots is very complicated, so the scientists needed to simplify the mathematics.

7 A 'minimum-snap trajectory' is the robot's way of flying as *fast / smoothly* as possible.

8 The team were inspired by nature when trying to programme the robots to *communicate / coordinate* with each other.

9 For lots of robots to fly in formation, it is *essential / impossible* to coordinate their actions in a central computer.

10 The disadvantage of working together to lift objects is the *risk of collisions / the decrease in agility*.

4. Discussion

Prepare 3-4 discussion tasks based on your presentation.

Work in groups. Discuss the questions.

A

Which aspects of the robots' abilities are most impressive, in your opinion?

B

Vijay Kumar's talk was given in 2012. How do you think the technology has evolved since he gave his talk?

C

What are practical application of the technology do you think is most useful?

D

Vijay Kumar claims that the aerial robots have many real-world applications. Discuss other applications that the technology could have. Use these areas to think of ideas.

agriculture, cartography (map making), communications, construction and architecture, education, emergency services, espionage (spying) and secret services, industry, leisure and entertainment, retail, tourism, transport and logistics