



Concours GE2I/GMEC/AMCPE session 2013

Composition : Anglais 2

Durée : 2 Heures



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Does Science Shape Technology?

Clearly, any efficacious politics of technology—any systematic attempt to ensure that the surprises are indeed good ones—needs an understanding of technological change. Let us begin to sketch an outline of such an understanding by tackling the most obvious force shaping technology: scientific change. Technology, it is often said, is applied science. Scientists discover facts about reality, and technologists apply these facts to produce useful things. As we have indicated, this view of technological change is a key underpinning of popular forms of technological determinism.

There are several things wrong with the notion of technological change as the application of scientific discovery. First, the notion of ‘discovery’—the uncovering of what is already there—is naive. Scientists are, of course, in constant, intimate dialogue with the real, material world, but they are active participants in that dialogue, bringing to it conceptual schema, experimental traditions, intellectual investments, ways of understanding the world, models and metaphors—some drawn from the wider society—and so on.

Furthermore, science and technology have by no means always been closely connected activities. Looking backwards is tricky, because people in previous times did not operate with our notions of ‘science’ and ‘technology’, and there is some controversy amongst historians who have studied the issue. But it can be concluded that before the latter part of the nineteenth century the contribution of activities we would now think of as science to what we would call technology was often marginal. The watermill, the plough, the spinning wheel, the spinning jenny, even the steam engine—these crucial inventions were in no real sense the application of pre-existing science.

Rhetoric about the contribution of science to technology there was in plenty, but the rhetoric often bore little relation to the modest reality of that contribution, and needs to be interpreted differently. Where science and technology are connected, as they increasingly have been since the second half of the 19th century, it is mistaken to see the connection between them as one in which technology is one-sidedly dependent on science. Technology has arguably contributed as much to science as vice versa -think of the great dependence of science on the computer, without which some modern scientific specialties could scarcely have come into existence.

Most importantly, where technology does draw on science the nature of that relation is not one of technologists passively deducing the ‘implications’ of a scientific advance. Technology, as the word’s etymology reminds us, is knowledge as well as artifacts, and the knowledge deployed by engineers is far from just applied science. Engineers use science. They seek from science resources to help them solve the problems they have, to achieve the goals towards which they are working. These problems and goals are at least as important in explaining what they do as the science that is available for them to use.

Adapted from *The Social Shaping of Technology* by Donald MacKenzie and Judy Wajcman, 2nd ed., Open University Press, Buckingham, UK, 1999

A. READING COMPREHENSION

I. Comprehension

Answer the following questions based on the text.

1. In your own words, what is the view commonly held about science and technology?
2. What does the author think about this opinion?
3. Have scientists and technologists always worked hand in hand in producing new things? Say why?
4. Can we say that technologists passively deduce the implications of a scientific advance? Why or why not?

II. True or false

Say whether the following statements are true or false.

1. Science does draw on technology.
2. Technology is one-sidedly dependent on science.
3. Science and technology have always been connected.
4. The most important force behind technology is engineering.

B. VOCABULARY CHECK

I. Word search

The following are definitions of words found in the text. Find them (Use only one word for each definition)

1. Something known to have happened or to exist, for which proof exists and about which there is information.
2. The process of finding some information, a place or an object for the first time.
3. Argument about something.
4. A machine that uses the energy from liquid fuel or steam to produce movement.
5. The hot gas that is produced when water boils.
6. Wrong in what you believe, or based on a belief that is wrong.

II. Odd one out.

The words and expressions in the table below refer to a specific subject. In each list, there is an odd one. Find it out and circle it then say which subject the box is about.

WORDS	SUBJECT
A. Bridges, dam, the theory of structures, skyscrapers, extension cord, dual carriageway.	
B. Fungi, property, reproduction, mite, fuse, carbohydrates, enzymes	
C. Morse, satellite, VoIP, broadcasts, scaffoldings, wireless, walky-talky,	
D. Tank, maintenance, bottom line, overheating, breaking point, radiator, fan	
E. Fuel, wind farm, eco-friendly, rotor, solar panels, panel beater, geothermal	
F. Shape, barcodes, computers, upgrade, certification, hardware, chip,	

LANGUAGE IN USE

1. Complete the text about developments in radio and television. Put the verbs in brackets in the correct form: Past Simple or Present Perfect.

In just over a hundred years, radio (1) (develop) into a major form of entertainment and communication. Marconi (2)..... (invent) a wireless telegraph system in 1896. This (3)..... (be) the birth of radio. Voice transmission (4)..... (start) in 1909 following the invention of the valve. Semiconductors (5)..... (make) it possible to develop much smaller, portable radios. The introduction in recent years of digital radios (6) (allow) us to enjoy much better sound quality. There (7) (be) many changes in television too. In the UK, the BBC (8) (start) daily TV broadcasts in 1936. Colour broadcasts (9) (begin) in the late 1960s. Since the 1970s satellite broadcasting (10)..... (allow) viewers a wider choice of programmes.

2. Rewrite this passage putting in *a*, *an* or *the* where necessary.

When (1)..... sunlight strikes (2)..... object(3).....colour of (4).....object depends upon (5).....wavelengths which (6)..... object reflects. If, for example, (7).....grains of (8).....sugar reflect equally all (9).....wavelength of (10).....spectrum (11).....grains appear white. If a surface reflects only (12).....wavelength which produces red and absorbs (13).....other waves of (14).....spectrum,(15).....surface appears red. Black is (16).....absence of (17) colour because (18).....black objects absorb all (19).....light of (20).....spectrum.

3. Give the passive of the following sentences to make the statements more scientific.

1. You should not have given solid food to the new born baby.
2. The sun has always heated the earth.
3. You cannot see nocturnal animals during the day.
4. Scientists have proved the existence of several subatomic particles.
5. John Thomson discovered the electron.