

Technical Literacy and Public Understanding of Technology.

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ABSTRACT

This article describes technical literacy and the public perception of technical literacy. Some of the broad reasons why the man on the street needs to be technically literate are discussed in this paper. The general process that science and technology follows to provide positive impact on the society are also treated. This article also emphasizes that it is imperative to have information before reaching a decision or conclusion.

(Keywords: technical knowledge, technical literacy, understanding, public, society)

INTRODUCTION

Technology is a product of human activity called development, just like the other commonly used word, science, which is a product of another human activity called research. The Longman dictionary of Contemporary English defines technology as “new machines, equipment, and ways of doing things that are based on modern knowledge about science and computers”.

Almost every day we use phrases such as “the speed of a car is 65 kmh⁻¹” or “when water is pure it boils at 100C”, or “a computer adds numbers by converting them to 0’s and 1’s”. But, how many of average citizens understand the meanings of these statements?

Perception, understanding, and evaluation of the meanings of the above statements which are commonly used in the society necessitate technical literacy. Technical literacy means having basic understanding of the ways machines, or equipment, or systems work or operate to enable us do things or make informed decisions, based on the modern knowledge of science.

REASONS FOR TECHNICAL LITERACY

How can we explain the curious contradiction in the public attitude to science and technology and the combination of respect and indifference? The discrepancy that accounts for the confusion in public opinion about technology may be the power of technology, combined with ignorance of the nature of technology and suspicion about its claims and motives.

It is most likely untrue to say that there is anyone left in the world who has not felt the positive impact of technology. Consider the transformation in communications, telemedicine, electronic banking, genetic modification of food for improved harvest and disease resistance, and disaster monitoring, and protection of the environment. It is now obvious that if modern radar technology had been available, the 1912 Titanic ship disaster, considered to be the worst in modern history, would have been averted.

Technical literacy is essential in every society because virtually every conversation – radio/TV news, public lecture, and announcement possesses scientific and technical content. Its perception, understanding, and evaluation by the man on the street necessitates accumulation of useful information called knowledge. This is possible if and only if he/she is equipped with fundamental concepts of technical literacy. This could be achieved during the primary education by including, at a superficial level, within the framework of elementary technology (physics, chemistry, and biology), topics such as electricity and magnetism, energy sources and conversion, chemical reactions (such as corrosion), and the biology of micro-organisms and viruses. These concepts could also be re-introduced at a degree/ HND level at an in-depth level to students who major in non-science courses.

Without technical literacy the average person may not understand why, for example, Norway, U.S and the Russian Federation ranked first, seventh, and fifty-seventh positions in 2004, respectively, according to Human Development Index (HDI) prepared by the United Nations Development Program (UNDP) [1]. He/she may not realize that this list was based on a model where statistics from infant mortality to life expectancy, through education, gross domestic product, etc. were used as significant data.

Without technical literacy it is hardly possible for the average person to understand why the World Health Organization (WHO) published a 60-page booklet on establishing a dialogue on risks from electromagnetic (EM) fields [2], or why the Intergovernmental Panel on Climate Change (IPCC) recently published a report strongly recommending coordinated efforts by governments across the globe to reverse or curb the rate at which our planet's climate is changing [3].

The World Health Organization (WHO) categorizes agents into four different carcinogenic stages, namely: (1) carcinogenic, (2) probably carcinogenic, (3) possibly carcinogenic, and (4) unknown. Without technical literacy it will be unreasonable for the man on the street to see reason in liking activities like the use of mobile phones or drinking coffee with potential health impacts. Recently, WHO classified electromagnetic fields radiated by GSM transmitters as possibly carcinogenic. Included in that list was caffeine, consumed from coffee, which may increase kidney cancer on one hand, and may be protective against bowel cancer [2], on the other hand.

An individual who is not technically literate is unlikely to agree that exposure to electromagnetic fields produced by Cathode Ray Tube (CRT) inside a television set may be harmful to television viewers. In fact, it is recommended that the remote control of domestic appliances such as television sets, DVD players, satellite receivers, and digital camera should be placed at "arm's length" to minimize the harmful effects of radiation emanating from hand-held remote controls.

The global economy is currently ailing or recessing, and we hope it does not result in depression. The resources of planet earth are currently under pressure. The rate at which man

is currently exploiting and harvesting from this planet is unsustainable [3], especially when matched with the rate at which the global population is exploding.

Average citizens, if not technically literate, would not understand, and may never agree, that energy only undergoes form-conversion and cannot be created. He/she may therefore disagree that energy exploration and exploitation are a function of energy demand, which is in turn, a function of global population. He/she may not comprehend why individuals need to trim or control (or plan) family size as it does not matter whether he/she has the personal resources to provide for a large family size. If a person is technically illiterate, they may not see the value in using energy-saving lighting fittings (bulbs) or even turning off all electrical energy-using devices when not in use.

Without technical literacy it is difficult to distinguish between a technical explanation or an absurd statement when someone on a TV or radio show talks about a futuristic prediction. The average man can not distinguish between an expert and a media con.

TECHNICAL PROCESS

Technology is vitally important; no one would argue that point anymore. Using the word "technical" as a prefix to another word, such as technical committee, technical result, technical viewpoint, etc., is synonymous to borrowing from the credibility of technology.

What makes science and technology more credible than anything else? Perhaps the credibility of technology can be attributed to the consistency in the process of science and technology. How can one compare or contrast between research and technical research, an answer and a technical answer, etc. A flow chart of technical process is shown in Figure 1.

Related to the physical and natural world, including the society, everything starts with a clear definition of a problem, no matter how and where it comes from (coincidence, questions, information, etc) and it ends up with general solutions as laws [4]. Technical process deals with studies building models to simulate, test and predict behaviours under different parameters, and to develop solution models.

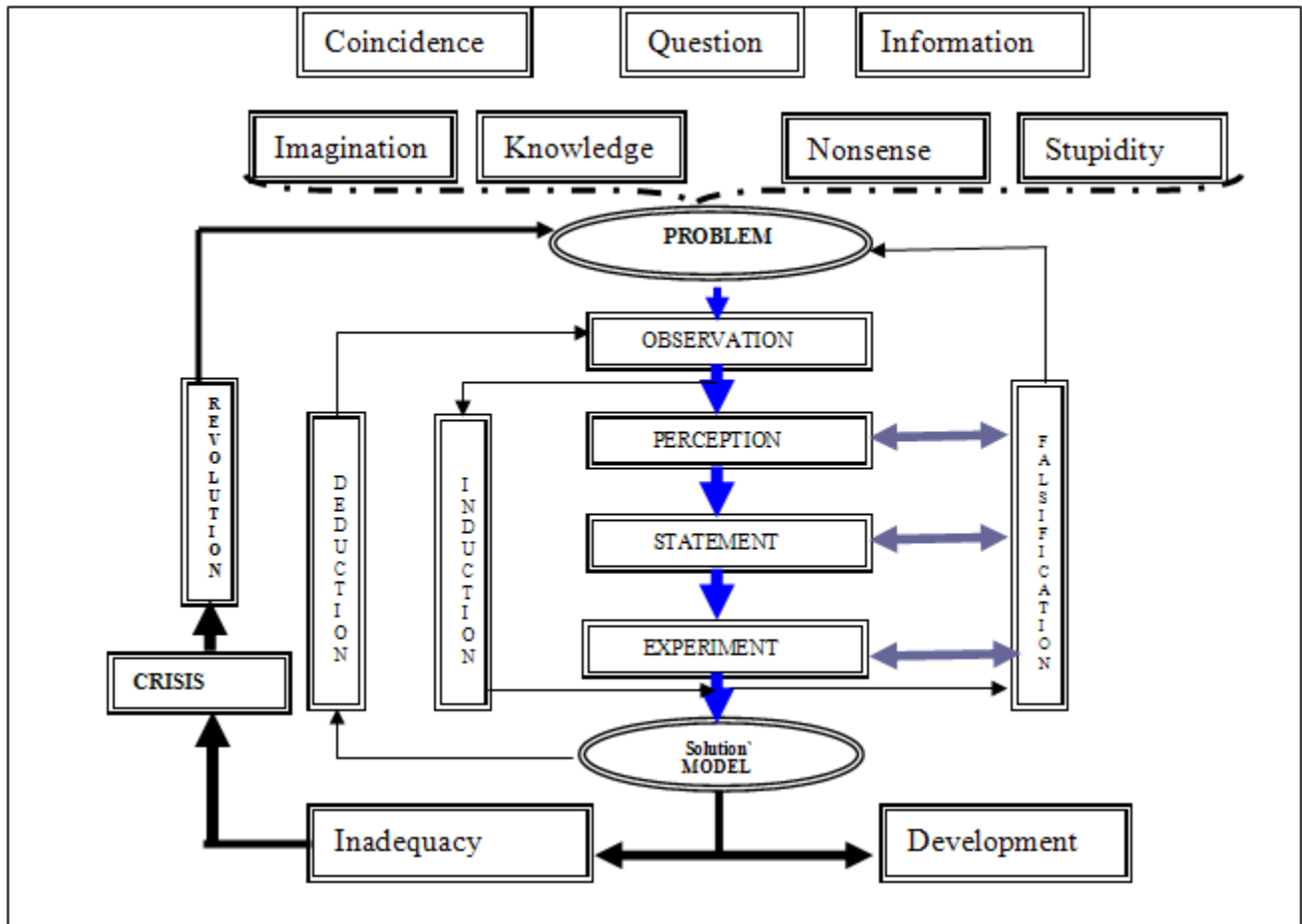


Figure 1: A Flowchart of Technical Process.

Within the historical progress there have been, in general, three different solution approaches; religious approach, philosophical approach and scientific/technical approach.

CRITICAL RESPONSE SKILLS

How does the average man distinguish between worthless statements, ideas, beliefs, and scientific/technical speech or explanations? The answer is to equip himself with critical response skills [5]:

- Do have information before reaching a decision, having an idea, or joining discussions. Feynman pointed out that people speak about and discuss on subjects that are unknown [6].

- Clearly indicate all assumptions of your statements and claims.
- Choose the right basis when you make a comparison.
- Do not confuse the truth with ideas/hypothesis/assumptions; do allow your ideas to make you blind.
- Do not authorize fame, listen to the experts (remember how effective it is for the people who watch a famous model, or a TV reporter losing weight with a kind of diet, as compared to listening to a dietician).
- Do not use indefinite/uncertain phrases like "Technology tells us that ..." or "famous Engineers claim that ...", etc.

CONCLUSION

Scientific advances, followed by fast changes in technology have revolutionized life styles in modern society, from the field of communication to marketing; from education to medicine; and so on. Society must be prepared accordingly, especially in terms of technical Literacy.

Novel education techniques such as problem-based learning and inquiry-based teaching may be discussed in detail to educate people for better technical literacy. Concepts like energy sources and conversion, electromagnetic radiation, thermodynamics, transducers, and material science could be introduced during primary and tertiary education.

The average man should be well-equipped to deal with data acquisition, information-based decision making, uncertainty, and epidemiology. Finally, lectures in science, technology and society, or public understanding of technology should be included/presented at all educational levels.

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