Technological Knowledge and Technology Education

PER NORSTRÖM

Doctoral Thesis in Philosophy
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Abstract

Technological knowledge is of many different kinds, from experience-based know-how in the crafts to science-based knowledge in modern engineering. It is inherently oriented towards being useful in technological activities, such as manufacturing and engineering design.

The purpose of this thesis is to highlight special characteristics of technological knowledge and how these affect how technology should be taught in school. It consists of an introduction, a summary in Swedish, and five papers:

PAPER I is about rules of thumb, which are simple instructions, used to guide actions toward a specific result, without need of advanced knowledge. One off the major advantages of rules of thumb is the ease with which they can be learnt. One of their major disadvantages is that they cannot easily be adjusted to new situations or conditions.

PAPER II describes how Gilbert Ryle’s distinction between knowing how and knowing that is applicable in the technological domain. Knowing how and knowing that are commonly used together, but there are important differences between them which motivate why they should be regarded as different types: they are learnt in different ways, justified in different ways, and knowing that is susceptible to Gettier type problems which technological knowing how is not.

PAPER III is based on a survey about how Swedish technology teachers understand the concept of technological knowledge. Their opinions show an extensive variation, and they have no common terminology for describing the knowledge.

PAPER IV deals with non-scientific models that are commonly used by engineers, based on for example folk theories or obsolete science. These should be included in technology education if it is to resemble real technology. Different, and partly contradictory, epistemological frameworks must be used in different school subjects. This leads to major pedagogical challenges, but also to opportunities to clarify the differences between technology and the natural sciences and between models and reality.

PAPER V is about explanation, prediction, and the use of models in technology education. Explanations and models in technology differ from those in the natural sciences in that they have to include users’ actions and intentions.

Keywords: philosophy of technology · epistemology of technology · technology education · technological knowledge · rule of thumb · explanation