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The technological knowledge used by technology education students in capability tasks

by

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Abstract

The inception of technology education as a learning area in the South African national curriculum has posed challenges different from those in the other learning areas. Technology education is, compared to subjects such as mathematics and science, still a fairly new subject both nationally and internationally. As a result technology education does not have a large research base or established subject philosophy. This can lead to problems in understanding the nature of technology and other pedagogical problems, such as the fragmentation of curricula in which content is simply parcelled in 'departments'.

One way through which technology can be conceptualized and understood is through *technology as knowledge* (epistemology). In the absence of an established subject philosophy for technology education, one can draw on frameworks from other disciplines in the field, such as engineering and design practice, for insights into technological knowledge. Educators, however, still need to determine the usefulness of these frameworks to technology education.

The purpose of this study therefore, is to investigate the usefulness of an epistemological framework chiefly derived from engineering to be able to describe the nature of technological knowledge, in an attempt to contribute towards the understanding of this relatively new learning area. The conceptual framework for this study was derived mainly from Vincenti's (1990) categories of knowledge and knowledge-generating activities based on his research into historical aeronautic engineering cases.

A combination of quantitative and qualitative research was used to provide insight into the categories of knowledge and knowledge-generating activities used by students at the University of Pretoria during capability tasks. This included an analysis of the questionnaire (quantitative data), which was administered to and completed by the students, as well as a content analysis (qualitative data) of the students' project portfolios.

Findings from this study suggest that the conceptual framework chiefly derived from and used by professional engineers is useful in technology education. The findings also suggest that both the categories of technological knowledge and the knowledge-

generating activities apply to all the content areas, i.e. structures, systems and control, and processing, in technology education.

The study recommends that researchers and educators deepen their understanding of the nature of technological knowledge by considering the categories of technological knowledge and the knowledge-generating activities presented in the conceptual framework. In order to "operationalise" the conceptual framework, educators must consciously attempt to include items of knowledge from each category of knowledge when conceptualising capability tasks for their learning programmes. The framework can then be used as a matrix to evaluate their learning programmes to ensure that all knowledge items (categories and activities) are addressed in each capability task in the technology learning programmes.

Keywords:
categories of technological knowledge
collaborative and cooperative learning
contemporary views of learning
knowledge
knowledge-generating activities
project- and problem-based learning
science and technology
technological knowledge
technology
technology education
transfer of knowledge

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