Enhancing Student Decision Making in Technological Practice

A thesis submitted for the degree of PhD Education

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ABSTRACT

This research focused on identifying the influence of conceptual understandings of *technological modelling* on students' ability to make informed decisions when developing technological outcomes. It also explored the relationship between student achievement in the components of Technological Practice *(brief development, planning for practice*, and *outcome development and evaluation)* and their concepts in *technological modelling*.

An emancipatory action research design was adopted for this study due to its responsiveness to the context in natural settings, and focus on critical reflection with intent to improve understandings and practice within social settings (Elliot, 1981; Poskitt, 1994). Quantitative and qualitative data were gathered using a mixed methods approach, consisting of a questionnaire, portfolio evidence and interviews. These data were gathered over three research cycles from 27 student participants who were in years 12 and 13 in 2008 and 2009 respectively.

Category labels were developed from literature and an initial exploration of the data, to describe the 'nature of reasoning' and the 'nature of practice' students applied when engaged in undertaking technological practice to address a need or opportunity. The category labels allowed exploration of the relationships between the different forms of reasoning students employed when undertaking technological practice. These labels also enabled exploration of how reasoning informed student decision making and supported their justifying that the technological outcomes they developed were 'fit for purpose'.

The research found a positive connection between student understanding of concepts underpinning *technological modelling* and their curriculum achievement in the components of Technological Practice - *brief development, planning for practice,* and *outcome development and evaluation*. That is, when student understanding of *technological modelling* were enhanced their competency to undertake *brief development, planning for practice*, and *outcome development and*

evaluation also increased. The research also showed that students who held more sophisticated understanding of *technological modelling* (Level 6 or above) could discuss how practical and functional reasoning work together to identify risk, and enable informed and justifiable design decisions to be made. In addition these students could also justify the technological outcomes they developed as 'fit for purpose in their broadest sense' (Compton, 2007; Compton & France, 2007b). In contrast, those students who held low curriculum level understanding of *technological modelling* (below Level 5) demonstrated a lack of ability to integrate practical and functional reasoning to inform their decision making when undertaking technological practice. As such, their decision making most often centred on determining the physical description of a technological outcome, with little apparent thought to social-technical considerations that underpinned its development, and later implementation into its intended environment.

This research concludes that when teachers support students to develop their curriculum understandings of *technological modelling* their ability in undertaking technological practice becomes more sophisticated, and they are equipped to develop technological outcomes that they can defend as 'fit for purpose in their broadest sense' (Compton, 2007; Compton & France, 2007b). The research findings therefore present a case for teachers to place an explicit emphasis within their teaching programmes on enhancing student conceptual understandings of *technological modelling*.

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ACRONYMS USED IN THESIS

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TiNZC	Technology in the New Zealand Curriculum	2
NZC	New Zealand Curriculum	2
LA	Learning Area	2
ECEC	Early Childhood Education Centres	2
NZQF	New Zealand Qualifications Framework	3
NZQA	New Zealand Qualifications Authority	3
MoE	Ministry of Education	3
NCEA	National Certificate in Educational Achievement	3
NZCMP	New Zealand Curriculum and Marautanga Project	4
IoP	Indicators of Progression	5
TKNoT: Imps	Technological Knowledge and Nature of Technology: Implications for teaching and learning	5
NMR	National Moderator Report	5
ELA	Essential Learning Areas	12
NZCF	New Zealand Curriculum Framework	12
MiNZC	Mathematics in the New Zealand Curriculum	13
TAiNZC	The Arts in the New Zealand Curriculum	13
NSSS	National School Sampling Study	14
TKMoA	Te Kaupapa Marautanga o Aotearoa	15
DeSeCo	Definition and Selection of Competencies: Theoretical and Conceptual Foundations	15
LAS	Learning Area Statement	16
TEALS	Technology Education Assessment in Lower Secondary	19
TKNoT	Technological Knowledge and Nature of Technology	19
BoT	Board of Trustees	119