Teachers and Curriculum

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

KAIAKO ME TE MARAUTANGA

VOLUME 14 2014

Correspondence and articles for review should be sent electronically to Teachers and Curriculum Administrator, Wilf Malcolm Institute of Educational Research, Faculty of Education. Email: wmier@waikato.ac.nz

Contact details

Teachers and Curriculum Administrator
Wilf Malcolm Institute of Educational Research
Faculty of Education
Private Bag 3105
Hamilton 3240
New Zealand

Phone +64 7 858 5171
Fax +64 7 838 4712
Email: wmier@waikato.ac.nz
Website: http://tandc.ac.nz

About the Journal

Teachers and Curriculum is an online peer-reviewed publication supported by Wilf Malcolm Institute of Educational Research (WMIER), Faculty of Education, The University of Waikato, Hamilton 3240, New Zealand. It is directed towards a professional audience and focuses on contemporary issues and research relating to curriculum pedagogy and assessment.

ISSN 2382-0349

Notes for Contributors

Teachers and Curriculum welcomes

- innovative practice papers with a maximum of 3,500 words, plus an abstract or professional summary of 150 words, and up to five keywords;
- research informed papers with a maximum of 3,500 words, plus an abstract or professional summary of 150 words, and up to five keywords;
- thinkpieces with a maximum of 1500 words; and
- book or resource reviews with a maximum of 1000 words.

Focus

Teachers and Curriculum provides an avenue for the publication of papers that

- raise important issues to do with the curriculum, pedagogy and assessment;
- reports on research in the areas of curriculum, pedagogy and assessment;
- provides examples of innovative curriculum, pedagogy and assessment practice; and
- review books and other resources that have a curriculum, pedagogy and assessment focus.

Teachers and Curriculum, Volume 14, 2014

Submitting articles for publication

Please consult with colleagues prior to submission so that papers are well presented. Email articles to T&C Administrator, Wilf Malcolm Institute of Educational Research, wmier@waikato.ac.nz.

Layout and number of copies

All submissions must be submitted online as word documents. Text should be one and a half spaced on one side of A4 paper with 20mm margins on all edges. Font = Times New Roman, 11 point for all text and all headings must be clearly defined. Only the first page of the article should bear the title, the name(s) of the author(s) and the address to which reviews should be sent. In order to enable 'blind' refereeing, please do not include author(s) names on running heads. All illustrations, figures, and tables are placed within the text at the appropriate points, rather than at the end.

Foot/End Notes

These should be **avoided where possible**; the journal preference is for footnotes rather than endnotes.

Referencing

References must be useful, targeted and appropriate. The Editorial preference is APA style; see *Publication Manual of the American Psychological Association* (Sixth Edition). Please check all citations in the article are included in your references list, if in reference list they are cited in document, and formatted in the correct APA style. All doi numbers **must** be added to all references where required. Refer: http://www.crossref.org/

Copyright

Acknowledgement of Reviewers

The Editors would like to acknowledge the contribution of the reviewers.

TABLE OF CONTENTS

General Edition

SECONDARY SCHOOL TECHNOLOGY EDUCATION IN NEW ZEALAND: DOES IT DO WHAT IT SAYS ON THE BOX?

ELIZABETH REINSFIELD
Faculty of Education
The University of Waikato

Abstract

Technology education, as mandated in the New Zealand Curriculum *(Ministry of Education, 2007) provides an opportunity for schools and teachers to offer contextually relevant and innovative curriculum responses. Recent governmental initiatives appear to offer additional transitional pathways for 'at risk' students but signpost new challenges for technology teachers who are already experiencing tensions between political agenda, school compliance and community expectations. The research upon which this article is based highlights that even when technology teachers feel motivated and empowered to enact curriculum change in their schools, local constraints require ongoing, negotiated responses to ensure that all of their students' diverse learning needs are being addressed. This article asserts that the continued political shift towards vocational education through initiatives such as the introduction of the Youth Guarantee Scheme, have the potential to further undermine the position of technology teachers and technology education within the New Zealand secondary schooling system.*

Keywords

Curriculum, diverse learning needs, technology, teachers

Introduction

Having taught food technology since 1994 (both in the United Kingdom and New Zealand), there have often been opportunities to lead student learning about the legal requirements of food packaging. It seems uncomplicated to invite students to review mandated requirements, apply that information to food packaging and then reflect and assess how it complies with 'what it says on the box'. If such an approach (reviewing curriculum requirements, apply to junior and senior programme structures and then reflect against teaching responses) was used when considering the practice of technology teachers in New Zealand, the process may not appear so simple. Schools are required to provide an opportunity for students to experience technology education until Year 10. However, the national rhetoric around vocational outcomes appears to significantly influence the programmes offered within the schooling system.

Findings from a qualitative small-scale case study are presented to highlight that teachers' practice within technology education continues to be influenced by historical misconceptions and community misunderstandings. The research was designed within an interpretivist framework which considered meaning, reasoning and agential perspectives (Briggs & Coleman, 2007) and sought to understand phenomena in context-specific settings. Two teachers, who were considered by university technology colleagues to be innovative in their practice, were purposefully selected because of their content knowledge about the research topic (Morse, 1991). Data were collected using semi-structured interviews, where open-ended questioning facilitated dialogue (Cresswell, 2005). Such an approach was used to identify the participant's understandings, values and interpretations of events about their situationally driven, curriculum responses (Menter, Elliot, Hulme, Lewin, & Lowden, 2011). Situational analysis was used to develop a picture of the context and stakeholders within the school community (Annan, 2005) and facilitated differing perspectives about the research topic (Clarke, 2005).

This article argues that whilst teacher responses may aim to minimise the effect of commonly held misconceptions around the purpose of technology education that the solutions found to accommodate student learning are usually a short-term solution. Consequently, it is timely for

Corresponding author
Email address: Elizabeth Reinsfield reinsl@waikato.ac.nz
ISSN: 2382-0349
Pages: 47–53

Teachers and Curriculum, Volume 14, 2014

teachers of technology (in New Zealand) to review the role and place of teacher knowledge in technology education (Jones, Buntting, & de Vries, 2013) by utilising school-based research to consider whether practice *does what it says on the box*. Such research can be used to illustrate the 'reality' of delivering the technology curriculum and provide a future voice for teachers who have been 'living' the curriculum since its implementation.

Technology education in New Zealand: What's inside the box?

The nature of New Zealand's political policy has a significant impact on technology education in schools. It reflects a trend observed by Young (1998), who states that in the United Kingdom the educational framework was dominated by:

> … attempts by successive conservative governments to maintain divisions between academic and vocational learning [to] siphon off as many young people as possible into vocational education and training programmes thus excluding them in effect from access to understandings they would need in the future as adults in an increasingly complex and uncertain society. (p. 2)

The current social context in New Zealand can be directly associated to the aggressive agenda of both Labour (1984-1990) and National (1990-1999) governments which pursued corporatization, marketisation and privatization and aligned themselves with the Treasury and State Services Commission to enable economically focused outcomes. 'User pay' policies have ensured that education has been positioned as a commodity; something that can be bought, traded or consumed (Pinar, 2003) and the government drivers ensure that the forces for change within New Zealand society are regularly assessed against future labour market's needs. It is acknowledged that a curriculum that is underpinned by such political drivers may be potentially marginalizing for teachers and within the context of technology education could perpetuate stereotypical and traditional understandings.

The nature of technology education has seen significant change in its philosophy and content (Williams, 2009). In New Zealand, a move for the subject from being practice based, to including a theoretical dimension has been rapidly implemented. Some practitioners found a new theoretical dimension difficult to address during its implementation. De Vries (2012) indicates that some technology teachers find the change of philosophy and content a challenge because they are "practical people who like to do practical things in class" (p. 15). The assumption that technology teachers are defined by their practical skills has assured that since its inception, technology education has been expected to rationalise its place in the curriculum and has been undervalued because of its practical nature (Williams, 2012). Williams (2012) questions why "studies about technical things that are pursued in a workshop are still regarded by many as second class and for the slower students. Why is there such an attitude?" (p. 3). It appears that this 'attitude' is pervasive with some technology teachers regardless of the nature of policy, curriculum and pedagogy in New Zealand. The academic validity of technology education is a route through which to justify the place and purpose of technology education in the New Zealand curriculum. However, the place of the subject appears to be tenuous and its purpose appears to be consistently challenged by school staff (including at a senior management level) and wider community misunderstandings.

There is no doubt that technology and technology education can be conceptualised from many perspectives, with differing interpretations of its purpose. Regardless, technology education should be an entitlement for all students, irrespective of their ability or skill (Kimbell & Stables, 2007). Students should be encouraged to generate their own understandings within a structured, realistic, inclusive and contemporary context (Ferguson, 2010).

What the label requires

The New Zealand curriculum (Ministry of Education, 2007) proposes an inclusive approach, advocating for socio-cultural and constructivist learning theories, where knowledge is developed through the collaboration between communities and its 'users'. The current technology curriculum in New Zealand has three strands, which now constitute technological practice (combining the original strands in the 1995 curriculum document), technological knowledge and the nature of technology

(Ministry of Education, 2007). Students are encouraged to be critical and innovative product, process, and system developers in a range of technological areas, identified as "structural, control, food, information and communications technology and biotechnology" (Ministry of Education, 2007, p.32). Technology teachers have been required to review their pedagogical practice to align with the mandated requirements (Snape & Fox-Turnbull, 2011). Snape and Fox-Turnbull (2011) argue that to enact the curriculum in technology education, teachers need to move away from traditionally placed pedagogical responses which are often mechanistic or reproductive in nature, rather than innovative or creative.

In December 2008, a re-alignment of the national examination system in New Zealand was announced. The need to align National Certificates of Educational Achievement (NCEA) standards of assessment with the recently implemented national curriculum framework was acknowledged (Ministry of Education, 2007). NCEA (New Zealand Qualifications Authority [NZQA], n.d.) are currently New Zealand's main secondary school qualification. Within such a framework, students are able to choose learning programmes from a range of subjects and they are assessed against 'Achievement Standards'.

NCEA technology standards are arranged within a matrix (see Table 1 below) from which standards can be taken from the 'generic' technology standards (on the top lines) or from those below, which are more closely associated with the needs of specialist areas (such as processing technologies). Such an approach is intended to support students' progression in key technological understandings and capabilities in line with the national curriculum achievement objectives. These achievement objectives describe the outcomes for student learning in technology and provide a description of what student outcomes may 'look like' over eight progressive levels.

As a result of these newly introduced NCEA standards, teachers of technology in secondary schools were encouraged to reflect on their junior secondary programmes. This enabled them to assess whether they were offering 'progressive' opportunities and experiences within a range of learning contexts, across a variety of technological areas as already highlighted by Compton and Harwood (2006). Teachers were then able to re-position their programmes, to support students towards success within the examination framework. As a result of the 2008 re-alignment, teachers were expected to provide meaningful learning pathways (including those students aspiring to university entry), which complied with the national curriculum requirements as well as addressing the needs and expectations of the community.

Table 1: Snapshot of New Zealand curriculum technology matrix

Generic Technology	AS91608 3.1 Undertake brief development to address an issue within a determined context *4 credits Internal*	AS91609 3.2 Undertake project management to support technological practice *4 credits Internal*	AS91610 3.3 Develop a conceptual design considering fitness for purpose in the broadest sense *6 credits Internal*	AS91611 3.4 Develop a prototype considering fitness for purpose in the broadest sense *6 credits Internal*
	AS91612 3.5 Demonstrate understanding of how technological modelling supports technological development and implementation *4 credits External*	AS91613 3.6 Demonstrate understanding of material development *4 credits External*	AS91614 3.7 Demonstrate understanding of operational parameters in complex and highly complex technological systems *4 credits External*	AS91615 3.8 Demonstrate understanding of consequences, responsibilities and challenges involved in technology *4 credits Internal*

	AS91616 3.9 Demonstrate understanding of how the fitness for purpose of technological outcomes may be broadly interpreted *4 credits Internal*	AS91617 3.10 Undertake a critique of a technological outcome's design *4 credits External*	AS91618 3.13 Undertake development and implementation of a green manufacturing process *6 credits Internal*	AS91619 3.14 Demonstrate understanding of the application of a technical area to a specific field *4 credits Internal*
Specialist Categories of Technological Knowledge and Skills	**Construction & Mechanical Technologies** Focuses on making and knowing how to make products and devices.	**Design and Visual Communication** Focuses on where visual literacy and creative thinking is developed, using visual communication techniques.	**Digital Technologies** Focuses on applying and knowing about computer science, electronic and digital applications.	**Processing Technologies** focuses on formulating and knowing how to formulate processed products.
	AS91620 3.20 Implement complex procedures to integrate parts using resistant materials to make a specified product *6 credits Internal*	AS91627 3.30 Initiate design ideas through exploration *4 credits External*	AS91632 3.40 Demonstrate understanding of complex concepts of information systems in an organisation *4 credits External*	AS91643 3.60 Implement complex procedures to process a specified product *6 credits Internal*
	AS91621 3.21 Implement complex procedures using textile materials to make a specified product *6 credits Internal*	AS91628 3.31 Develop a visual presentation that exhibits a design outcome to an audience *6 credits Internal*	AS91633 3.41 Implement complex procedures to develop a relational database embedded in a specified digital outcome *6 credits Internal*	

The establishment of Trades Academies in 2011 and the introduction of the Youth Guarantee Scheme in 2013 (Tertiary Education Commission [TEC], 2014) suggest a considered political shift towards vocational pathways. They are viewed as a means with which to retain NCEA Level 2 student numbers and improve national achievement outcomes on a larger scale. The Youth Guarantee Scheme (TEC, 2014) is intended to support youngsters' (aged 16 to 19) transition from school to work. Trade Academies can offer a route whereby schools are provided with a funding incentive if they deliver senior programmes which focus on vocational outcomes in partnership with tertiary institutions and industry training organisations. On the surface, the introduction of such strategies could appear to situate technology education more securely as these programmes draw upon standards from the technology matrix. There is the potential however, for these financial incentives to inadvertently marginalise the students who have a passion for technology education (as conceptualised in the curriculum) rather than the trades. Consequently, it may make financial sense for schools to develop programmes which attract the economic benefits associated with a more technical or vocational route. The consequent impact is that curriculum structures within the junior secondary context are likely to mirror or scaffold towards such an approach, rather than adhere to the mandated requirements of the curriculum. Aligned with this, is the need to adjust programmes to address the theoretical content within technology education. Differing traditional orientations towards the technology education curriculum, appear to be contradictory rather than complimentary and programme design needs to be carefully negotiated.

Opening the box: The research study

The author's 2012 pilot research employed a case study approach (within two schools) involving two teachers and two semi-structured interviews per participant. Sally (pseudonym) trained as a Physical Education teacher in the mid 1990s and was the acting Head of Technology in her school. She had been teaching food technology for two years. Holly (pseudonym) had been teaching within her community for sixteen years, having moved from a role in the prison service. She was the Head of Soft Materials.

Interviews with the teachers suggested that the opportunity for change was closely aligned to the particular school context and its staff dynamic. Findings indicate that the participants experienced differing levels of tension when aligning and facilitating support for others' practice with the curriculum framework. Both participants suggested that often the motivation to deliver a programme which was meaningful for a diverse range of students was outweighed by the need to be strategic in terms of the school communities' expectations or as a consequence of their own evolving pedagogical content knowledge. Professional tensions are illustrated in Holly's comment:

> … the principal wanted to improve teaching and learning throughout the school … she took technology as a compulsory subject out of our area and put it into the four main learning areas and that was huge. I was responsible for monitoring that in the first year and when we came to reporting, I designed a reporting system, each of the HODs [Heads of Department] said that they had nothing to report on, they would not write a report and it was really evident that they had not been teaching technology....

According to Sally, compliance in the delivery of the national technology curriculum was not of high priority, stating "… it never came up whether we taught technology … they really liked the food so much [and therefore] we must have been doing a really good job". She talked about her experiences when seeking professional development to support her programme design, stating "… I've been to PPTA Best Practice workshops … but everyone is doing something different … I've gone for a 'pick and mix' [of achievement standards] because of my background…. I've been a jack of all trades and a master of none". She also indicated a lack of understanding by others of the role of technology education, stating that "… the [community] have no idea; they just want to know if [their child] can make a flat white [coffee] really well".

A continuing climate of change means that teachers potentially have to consistently re-position and re-justify the place and nature of technology education in New Zealand schools. During the research Holly stated that the food technology area in her school was acknowledged, "… in terms of [generating] good publicity for the school and [as] a good selling card for them". She indicated the need to carefully negotiate the misunderstanding that technology education equates to a trade pathway. Holly stated, "… I've just had my appraisal and I said that I feel that they undervalue our subject … I was told that they don't undervalue us … that we do amazing things with regards to hospitality".

The recent earthquakes in New Zealand have highlighted a demand for qualified trades' people. Technology education is consistently held as a means of addressing such workforce demands. This aligned with the historical and contemporary misconceptions around the purpose of technology education, highlight various challenges for teachers.

1. Technology education is still seen as a means through which to direct 'at risk' students towards practical and vocational pursuits rather than as a subject which facilitates innovative and critical thinkers.
2. Technology education can be positioned as a means with which to 'support' the learning in other areas of the curriculum, rather than as a stand-alone subject in its own right.
3. There are enduring tensions between school communities' perceptions around the purpose of technology education and the professional expectations for technology teachers' own evolving pedagogical content knowledge and inclusive practices.

Time to get on the 'soap box'

There clearly need to be changes to schools' organisational structures in order to facilitate the delivery of the current technology education curriculum (Ferguson, 2010). According to the national curriculum document, to offer students with the best chance of success, "teachers [should] deliberately build on what their students know and have experienced to maximise the use of learning time" (Ministry of Education, 2007, p. 34). Such an approach requires significant negotiation. The rhetoric around vocational pathways suggests that there will be more choice for learners, that diverse learning needs will be catered for and that there will be an easier transition for 'at risk' students from school to tertiary study or employment. At face value, the pathways appear to address some of the issues facing teachers who are motivated to address the diverse needs of students within their secondary school technology education programmes. It remains to be seen however, whether this strategy will in fact further entrench past ideologies around the nature of technology education in schools, with the outcome being that it's about financial viability rather than addressing the diverse needs of all of the students in our care.

If we fail to negotiate a path which accommodates the needs of all students within technology education, we run the risk of reverting back to a subject which is reminiscent of the early twentieth century where the content is in fact technical in nature, with a role to solely address commercial and industrial demands (Abbott, 2000). Is it acceptable to expect New Zealand technology teachers to continuously think outside of 'the box'? I suggest that there needs to be further research in order to determine how the persisting dominant discourse in technology education can be challenged. A policy move towards a curriculum which empowers technology teachers to negotiate the tensions of political agenda, school and curriculum expectations, and their own evolving pedagogical practices (Apple, 2004; Apple, Kenway, & Singh, 2005) is recommended. This article asserts that our current responses do not provide optimal learning environments for many of our students and merely perpetuate an existing concern. It's time to challenge the thinking that technology education is only about 'making the box'.

References

Abbott, M. (2000). The development of vocational education and training in New Zealand. *Education and Training, 27*(1), 90–108.

Annan, J. (2005). Situational analysis: A framework for evidence based practice. *School Psychology International, 26*(2), 131–146.

Apple, M. W. (2004). *Ideology and curriculum.* New York, NY: Routledge Falmer.

Apple, M. W., Kenway, J., & Singh, M. (2005). *Globalising education: Policies, pedagogies and politics.* New York, NY: Peter Lang.

Briggs, A. R. J., & Coleman, M. (2007). *Research methods in educational leadership and management.* London, England: Sage.

Clarke, A. (2005). *Situational analysis: Grounded theory after the postmodern turn*. San Francisco, CA: Sage.

Compton, V. J. & Harwood, C.D., (2006) *Discussion document: Design ideas for future technology programmes.* Retrieved from http://ri.search.yahoo.com/_ylt=AwrSbmMtL1lUQywAeC3zZgx.;_ylu=X3oDMTByaDNhc2JxBHNlYwNzcgRwb3MDMQRjb2xvA2dxMQR2dGlkAw--/RV=2/RE=1415159725/RO=10/RU=http%3a%2f%2fnzcurriculum.tki.org.nz%2fcontent%2fdownload%2f482%2f3705%2ffile%2ftechnology-design-ideas.doc/RK=0/RS=L5oo1X4GSRSpjFeAFSHhx0e.sAA-

Cresswell, J. W. (2005). *Educational research: Planning, conducting and evaluating quantitative and qualitative research.* Upper Saddle River, NJ: Merrill.

De Vries, M. J. (2012). Philosophy of technology. In P. J. Williams (Ed.), *Technology education for teachers* (pp. 15-34). Rotterdam, The Netherlands: Sense.

Ferguson, D. (2010). Development of technology education in New Zealand schools, 1985–2008. Wellington, New Zealand: Ministry of Education.

Jones, A., Buntting, C., & de Vries, M. J. (2013). The developing field of technology education: A review to look forward. *International Journal of Technology and Design Education, 23,* 191–212.

Kimbell, R., & Stables, K. (2007). *Researching design learning. Issues and findings from two decades of research and development.* (Science and Technology Education Library, 34*)* Berlin, Germany: Springer Science.

Menter, I., Elliot, D., Hulme, M., Lewin, J., & Lowden, K. (2011). *A guide to practitioner research in education*. London, England: Sage.

Ministry of Education. (2007). *The New Zealand curriculum.* Wellington, New Zealand: Learning Media.

Morse, J. (1991). Strategies for sampling. In J. Morse (Ed.), *Qualitative nursing research: A contemporary dialogue* (pp. 127–145). San Francisco, CA: Sage.

New Zealand Qualifications Authority (n.d.). *NCEA*. Retrieved from http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/

Pinar, W. F. (2003). *International handbook of curriculum research.* Manwah, NJ: Lawrence Erlbaum.

Snape, P., & Fox-Turnbull, W. (2011). Perspectives of authenticity: Implementation in technology education. *International Journal of Technology and Design Education, 23*(1), 51-68.

Tertiary Education Commission (2014). Youth Guarantee. Retrieved from http://www.tec.govt.nz/Funding/Fund-finder/Youth-Guarantee/

Williams, P. J. (2009). Technological literacy: A multiliteracies approach for democracy. *International Journal of Technology and Design Education, 19*(3), 237–254.

Williams, P. J. (2012). Research in technology education: Looking back to move forward. *International Journal of Technology and Design Education, 23,* 1–9.

Young, M. F. D. (1998). The curriculum of the future: From the 'New sociology of education' to a critical theory of learning. London, England: Routledge Falmer.