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It's Time to Study Values at the Core of Food Technology Education

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This paper seeks to explore the values of academic culture in the secondary teaching genre of Food Technology. Historically, education providers have displayed a traditional syllabus design and interpretation of the Food Technology industry. This paper argues that the NSW Food Technology Syllabi has largely been a re-badging of the former home economics/domestic science curriculum and warrants a new perspective. New societal values have influenced innovation in food products, from valuing indigenous bush harvest, links between naturopathy and food, and strengthening values that link eco-sustainability with synthetic foods. These new developments present a compelling case to rethink the future and content of food technology in schooling. It requires a new theoretical framework to accommodate the new understanding now evident in the subject matter as it now occurs "beyond the school gate" in the wider global economy. A key feature of this paper asserts that food technology education is overdue for a rethink that involves searching for a new coherent framework that can articulate both a core place for the study of values and a place for emerging knowledges with particular regard to innovation. The paper explores the merits of technacy and innovation theories that when combined, creates a powerful and unifying method for both affective and cognitive learning and assessment for guiding skill and practice.

Introduction

"In any journey we should be concerned about where we are going, what vehicle is the appropriate one to use, how it is driven, and how we can tell when we have arrived" (Hall, cited in Hughes, 1973, p. 272).

Historically, Food Technology as an area of study today, developed within the general framework of the growth and development of public education in the penal colony of NSW (Department of Education and Training [DET], 1980, p.13; Peacock, 1982, pp. 17). This was in response to the immediate needs of a colony that required not only social and moral enlightenment, but knowledge, values and attitudes pertaining to health, hygiene and well-being. In reflection, this was a period that was economically and politically unstable with associated problems of a scattered population (NSW at the time included Queensland and Victoria) and one that was divided on religious lines. The Public Education Act in 1880 severed the ties between church and state, and in doing so, established a basic framework for education in NSW (DET, 1980, pp. 44, 46; *ibid*, p.17).

Up until the 19th Century, there were no syllabi to explain the content and nature of courses, only questions set for the women who gave instruction in what was known as Domestic Economy, that later evolved as Domestic Science by 1910. These questions provide the only clue to the content of the studies and the degree to which courses reflected the society and cultural values of the time i.e. reinforcing women into subservient roles and confining them to duties largely relating to the home and family (Suttor, 1882, pp. 127-147). The early 1880's witnessed a growing demand for secondary education which led to the expansion of colleges for boys and girls, both offering academic studies such as Reading, Writing, Arithmetic, Grammar, Geography, Scripture, French, Latin, Euclid (Geometry) and Algebra (DET, 1980, p. 53; Peacock, 1982, p. 22). Many academics heralded the importance of intellectual growth (more so for boys), but also cited the need to incorporate training for students that 'bridged the gap between the previous home life and the pupil's future life-work' (Martin, 1910, p. 355, 356). The manual craft skilling of students during this period complied with the economic climate of the Industrial Revolution and the gender roles in society. Sloyd work was introduced for boys that aimed to develop their manual dexterity and hand-eye co-ordination with the view to set them in good stead to acquire a manual skilled job (Ibid, p. 355). In comparison, a girl's vocation in life was to become suitably qualified in domestic duties, primarily as a good homemaker, but also as an occupation if sought.

"I have come to the conclusion that it is practicable at a slight additional expense to make cookery one of the subjects of instruction in public schools for all the elder girls beginning in the larger schools and gradually extending it to all schools where there is a female teacher. Looking at the future, all female teachers in training should be made qualified to teach the subject. I cannot feel any doubt that the Department will perform a public service if it sends out of public schools the future mothers of the country qualified to perform domestic duties connected with the preparation of food so as to combine economy and cleanliness with good cookery for the benefit of the masses of people" (Trickett, 1883, cited in Peacock, 1982, pp.27, 28).

The literature reveals that the same traditional approach toward gender skilling remains evident today, and as such, offers a narrow pathway for jobs beyond the school gate in the contemporary economic climate (Barak, Maymon and Harel cited in Davies, 1999, p. 14; Deal, 1999, p. 1; Goodson cited in Davies & Hansen, 1998, p. 19; Lawson, 2000, pp. 3-5; Seemann, 2006, p.2). This paper argues that (1) the subject area has not been adaptive to contemporary economic change and that (2) the national priority for innovation is falling short in this field of technology due to the same conservative values.

Who Drives the 'Values' in Education?

Most economists and researchers would argue that research in the subject area tempered by the 'economy' (whether it be national or global), should together offer the broad direction of curriculum content, but it is put forward it is driven by niche stakeholders who have a vested interest in traditional manual skills. Since the formal approach to education led to

the structural design of a 'Syllabus' in 1911, home care and management tasks in food study have continued to dominate up until the 1930's and beyond.

"These schools, as the name implies, aim at giving the girl that instruction which will enable her to fill more adequately the position she now occupies as daughter in the family, at directing her attention to and equipping her for the responsibilities of a home maker, and at the same time, giving her some preparation for the occupation she is likely to enter on leaving school" (Minister for Education, 1930, p.123)

However, a new frontier in the subject during the 1950's attempted to implement a syllabus that had the potential to integrate with other curriculum areas, particularly science. The 1952 Home Economics syllabus reflected the importance of science, experimental cookery and nutrition and where some content of the syllabus was required to be carried out in a science lab by either a Home Economics teacher, or Science staff member (NSW Department Education Training [NSW-DET], 1952, p. 1). This was a radical departure from the previous syllabus that retained a strong 'domestic' flavour such as business methods in the home, value of money and women's work in the home.

Given the 1950's economy at the time was recovering from the aftermath of World War II, there was a strong sense of self-expression, creativity, resourcefulness and frontiers in science and philosophy. Added to this were the changing societal needs, particularly for women, i.e. equal pay enhanced the attractiveness for work (DET, 1980, p. 213; Peacock, 1982, p.13; Wikipedia, 2006). While the 1952 Home Economics syllabus contained an important element that signalled the first 'values' by way of developmental, practical and cultural aspects, the syllabus reflected a strong science base that aimed to question the "why" rather than undertake the "how to" alone. However, the syllabus also contained conflicting aims in that it sought to "train the pupil for future home making" by way of housewifery and domestic hygiene subjects (NSW DET, 1952, p. 1). By trying to keep in step with the changing needs of society and acknowledging the need to retain the family unit, the syllabus created a dilemma with regard to teacher interpretation. As a result, and perhaps due to the sheer magnitude of the syllabus intent, the tensions of the times led to the science application being 'shelved' by many in how the syllabus is taught.

This scenario resonates today as the subject has failed to accommodate an association with the changing knowledge in food innovation research and the realities of the emerging economic climate. As such, the study of Food Technology has had relatively low esteem in the curriculum as a job pathway into the food science and technology industry. It is argued this is largely due to the view projected of the subject by many that the study of Food Technology is about the development of culinary skills and nutrition almost exclusively. Conversely, Lang and Caraher (2001, pp. 4 & 13) argue that traditional cooking/culinary skills are becoming redundant in the economy due to the dramatic changes over the past twenty years in technological food innovations and the heavy demand for not only 'take-

away' and 'eating out' societal changes but also 'ready-to-eat' convenience meals in the home. There remains a niche interest in day house cooking but even this is now addressing food health sciences and new cooking technologies. This is largely due to the increase of women in the job market and the diffusion of food innovations into the same.

An interesting point should be signalled that the NSW Board of Studies clearly states the removal of the study of food innovations from the 1999 Food Technology Stage 6 syllabus. This raises the argument that the understanding of 'creative and adaptive behaviour through the study of innovation and holistic technological practice' (Seemann, 2006, p. 2) is minimalised, if not displaced altogether as an area of study. Added to this, the NSW Food Technology Elective syllabus Years 7-10 only briefly covers an important area of study such as 'value adding'. Given 80 per cent of our goods and services are value added, with the core development work derivative of knowledge, not manual labour (Covy cited in Ibid, p. 2), and from investment in new technologies, this wider context presents a compelling case to rethink the future and content of food technology education as a supplier, given the traditional approaches to teaching that appear to be inadequate and misplaced in today's society. Key 'economic drivers' in the food industry for over the past ten years have been innovations in the indigenous bush food industry, links between naturopathy and food, and the strengthening of values that link eco-sustainability with synthetic foods. In terms of keeping the school study of Food Technology contemporary, these three drivers ought now reflect as core food curriculum and not a fringe idea.

Who should be the Driver of 'Values' in Food Technology Education?

There is anecdotal evidence that a significant proportion of teachers in the technology field struggle and resist, more than one would expect, cultural and technology change. They may also fall short of the qualification standards that the profession itself is beginning to set for teaching technology in secondary schools (Department of Education, Science and Training [DEST], 2003, pp. 5,17,18, 67,84). The situation opens a serious disparity between fundamental needs to engender design and innovation skills education for the future, and an aging technology teacher skill base in schools not familiar with such new and enhancing notions in the economy, and research literature as innovation and technacy (i.e., technacy refers to holistic technological capability¹) based pedagogy priorities. In support of this argument, Goodyer (1999, p.8) states the aging technology teacher skill base in schools suffer a lack of technological familiarity and transfer. Additionally, DEST (2003, pp. 81-84) clarify this lack of technological familiarity as teaching 'out of field'.

“Technology transfer begins with the development of a new technology or the modification of an existing technology. This development process occurs in reaction to a perceived want or need for a product and results in technological activity. This activity results in the expansion of human capabilities through the creation of technical

¹ For Technacy Education see also URL:< <http://en.wikipedia.org/wiki/Technacy>>, and the recent Northern Territory Review of Secondary Curriculum by Dr Gregor Ramsey, December 2003 via URL: <http://www.betterschools.nt.gov.au/history/docs/report/report.pdf>

processes, artifacts, and knowledge. All technological activity occurs within a social, economic, and psychological context. The activity itself is the "result of combining ingenuity and resources to meet human needs and wants" (International Technology Education Association, 1996, p. 11). The resultant technology emerges through the combination of knowledge, thinking processes, and physical means. The outputs of technological activity are innovations or modifications of existing technologies that fall within the categories of physical, biological, informational, and organizational technologies" (Johnson, Foster, & Satchwell" 1989, pp.3, 4).

Added to this, is a recent trend in NSW to quickly push into schools briefly trained mature age industry graduates. Vocational education trained hospitality trade persons are able to be recruited for a two-year teaching degree in Food Technology (NSW DEST, 2006). Given Hospitality falls under a completely different sector (Food and Beverage service) to that of Food Technology (Food Science and Technology), it is hard to understand, given the increasing need for society to grapple with the complex and ubiquitous nature of technology in our lives, the retrogressive thinking of education bodies and their apparent lack of valuing "values" in Food Technology education. The question could now be asked of the Board of Studies and of the Education Department: "Is the subject label 'Food Technology' in reality, taught and serviced as "Hospitality" rather than the study of food design, science and technology?" There is a serious disparity recognising the difference between the food technology genre and industry practice. Because of this, Food Technology has for some time now been a syllabus that is highly vulnerable to suffering a 'succession demise' in valuing the necessary academic culture of its true study.

This argument is supported by a national food industry study undertaken in 2003 by KPA for Food Science Australia that revealed students equate food technology studies with the hospitality industry, not food science and technology. Although the study pointed out the NSW Stage 6 syllabus retained a stronger link with food science industry practices in theory than other state syllabi, it is argued that in practice this is not always the case with the interpretation from some teachers within the classroom. The study also signalled that nationally, all food syllabi, including the NSW 7-10 syllabi, was largely a 'rebadging' of former Home Economics or Domestic Science curriculum (KPA, 2003, pp. 5, 43,18). There is a strong case that further supports this argument given the statement in the "A Guide to the New Years 7-10 Syllabus":

"The [current] syllabus content and current programs can be modified to meet the requirements of the new syllabus and many existing units of work will form the basis of effective programs. The majority of existing resources will continue to be relevant" (NSW Board of Studies, 2003, p.1).

Due to this lack of understanding of the current innovation and knowledge economy, the conventional syllabus concepts will dominate due to their alignment to the skill genre of the aging technology teacher population. With the rapid pace of change in technology and given the knowledge and understanding of the current pool of teachers, the new generation of teacher and curriculum knowledge will be substantially challenged. Lewis (cited in

Rogers, 1996) concludes pre-service teachers need depth of technical content, not necessarily breadth.

“I believe we have to rethink especially the technical content aspect of technology teacher education programs. Curriculum research in industry could help here. We need teachers who are technically competent to supervise the construction of a workable solar vehicle in their high school laboratories. ... What this means is that pre-service technology teachers need depth, not breadth, of exposure to the major processes of industry (ibid, p. 53).

Education and training systems need to be focused not only on the development of strong technical and applied skills, but more importantly, the impact, processes and output of present day sub-systems (Henak, cited in Rogers, 1996, p. 42). The attributes and visionary profile for work skilling, and this includes the undergraduate teachers, need to have well developed employability skills such as communication, teamwork, problem solving, ongoing learning, creativity, cultural understanding, entrepreneurship and leadership (Business Council of Australia, 2006). However, there are very few four year undergraduate technology teacher education programs left nationally, with only one in NSW that offers the package of a deep immersion in the study of technology, research, information exchange and professional technology and leadership. It is postulated, those few who remain are the flag bearers for innovation and who continue to battle recalcitrant and political opponents that resist technology and pedagogic change more than one would expect. The thesis for which this paper contributes, argues that a holistic understanding of Food Technology is better placed to foster particular values that may underpin innovation qualities among learners than a formulaic understanding. It is this formulaic approach that develops an unbalanced individual and one that offers student's poor transfer skills into different contexts (Seemann, 2003, p. 2).

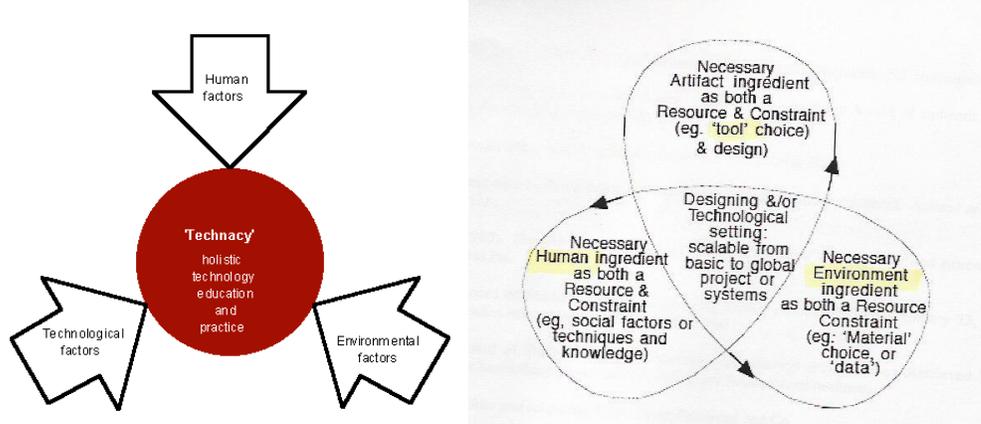
Innovation, Technacy and Food Technology Education

“Innovation is a value in all areas of education” (DEST, 2003, p. 4)

There are many facets to try and better connect content to practice but there are few frameworks that align cognitive and learning assessment into technology practice. A way forward is a promising approach that offers a theoretical framework known as Technacy. This framework aims to accommodate new understandings now evident in the subject matter and seeks to combine holistic ideas about technology with contemporary studies of human capacities in innovation. The fundamental praxis of Technacy ‘considers access and equity’ and ‘ensures that social and environmental inputs are considered equally valid parts of science and technology decision making processes’ (Seemann, 2000, p. 4). It is arguably the most contemporary framework to measure and guide technological outcomes. Given

'technology is multifaceted' (Fleer and Jane, 2004, p. 179), Technacy has the intellectual, practical and ethical dimensions that allow us to understand the 'educational value of

technology' (Seemann and Talbot, 1995, p. 762) in terms of the relationship between one genre of technology in conjunction with another.



(Seemann and Talbot, 1995; Seemann, 2003)

Technacy is able to specify and address technological understanding in, for example, food science and the purpose of food technology products, with respect to the knowledge of how they are designed to respond to contemporary economic and lifestyle drivers. Given an initial study of a technology's intended *purpose and context* of use, the basic principles involve the inter-relationship between the:

- *Human factors* including adaptability to new knowledge, values and contemporary food science and technologies intrinsic to the learner.
- *Tool or Technical System factors* including specific knowledge of contemporary technical production systems and devices (understanding, choosing and exploiting new and emerging food 'tools' and technical systems) and
- *Material/eco-environment factors* including knowledge of innovations in food produce and packaging materials (investigating and appropriately choosing consumable resources in harmony with the purpose and contexts of projects).

Accordingly, "technate people study the context of a technological problem in a comprehensive way before selecting the knowledge, tools and resources needed to progress a solution. This comprehensive assessment of *purpose and context* is [seen as] critical to the [practical] success of the solution" (Wikipedia, 2006).

In order to understand the new demands in the Food Science and Technology fields, and associate Design and Technology learning areas of the NSW DET curriculum, the application of Technacy theory is able to provide headings and a system to describe how technologies are used, observed, developed and evaluated. Therefore the theoretical framework applies a formula where (a) the three lobes of Technacy enable us to define technological activity within a context and purpose and where (b) innovation and the observable characteristics of innovative behaviour can be holistically classified within that context. The capacity to embrace, exploit and holistically integrate new Food Technology knowledge and systems for designing solutions in contexts (time, place, economics, policy, population/culture) are factors that are hard for an individual learner/designer to control but which are able to shape their solution's appropriateness and sustainability. Similarly, and for the larger study with which this paper is associated, the framework will be used to collect information and attempt to analyse particular headings and workings together as they pertain to the research shown in Table 1, 2 and 3 following:

Table 1

Context area A: Food Technology industry and research literature-Demand Driver			
Purpose	Human factor	Tool factor	Material/ Ecology factor
Evolution of food product innovations			
Evolving political/economic purpose			

Table 2

Context area B: Food Technology in Schools-Supply Driver			
Purpose	Human factor	Tool factor	Material/ Ecology factor
Evolution of Food based curriculum			
Evolving Political/economic purpose			

Table 3

Context area C: Teacher education: Supply Driver			
Purpose	Human factor	Tool factor	Material/ Ecology factor
History of food oriented teacher education			
Evolving Political/economic purpose			

Conclusion

This paper has presented the case that we can no longer perceive or present technology as a narrow endeavour for using tools, such as the culinary skilling with equipment. Economic, societal and environmental factors demand a more comprehensive understanding and so too our capacities for judgement of everyday aspects of our material culture. Fler & Jane (2004, pp. 13,14) recognise the importance to teach, learn, research and develop technological understanding holistically rather than 'teach technical skills defined independently of the social and environmental context'. This view is supported in the literature, especially with the ideas underpinning food technacy education as a way forward that identifies the 'demand-driven' view of jobs or *judgement making* beyond the school gate. As such, food technology syllabus design and content requires a new approach to stimulate updated and relevant ideas in teaching and learning of food technology and technacy education (Australian Science Technology and Engineering Council, 1996; Business Council of Australia, 2006; Commonwealth and Australia, 2003; Department of Education, Science and Training, 2003; Education Training Youth and Affairs, 2000; Innovation Summit Implementation Group, 2000; Ramsey, 2004; Seemann, 2000a, 2003, 2004, 2006; Fee & Seemann, 2002; Slaughter, 1999; Walker, no date).

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