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Clarifying Sustainable Food Technology Futures through Technacy Genre Theory

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Abstract
In order for education systems to nurture a culture of innovation and sustainability in the school staff room, this research asserts that far greater clarity and classification methods need to be employed to define exactly what the subject matter and learner attributes in schools are meant to address compared to the wider world demands upon it.

Key Words: Food Technology; Technacy Genre Theory; Sustainability; Innovation; Curriculum and Food Science Education.

This paper presents research recently undertaken that sought to clarify apparent confusion between the school view of the field of knowledge known as 'Food Technology' in Australia and the wider professional views of the same. Food Technology was selected as a curriculum issue for clarification research because world food supplies have reached serious levels of concern (Food and Agriculture Organisation of the United Nations, 2010), demanding that society develop more innovators in this area for our future. Yet the same subject area in school systems can often be presented in much more conservative forms. The core of this paper clarifies the perceptions between schools and the wider profession, and in this process identifies whether the two domains of practice are essentially referring to two separate forms of Technacy Genre. The role education can play in helping prepare society to develop a culture of innovation and sustainability around food practice is crucial and deserves clarification.

> Population, consumption, technology, development, and the environment are linked in complex relationships that bear closely on human welfare in the global neighbourhood. Their effective and equitable management calls for a systemic, long-term, global approach guided by the principle of sustainable development.
> (Commission of Global Governance, 1995, p. 30).

The dominant line for teaching Food Technology in schools has largely constituted end-user cooking skills (that is, consumption based) but is this existing practice sustainable for the twenty first century? To begin to answer this question, the paper first clarifies a core question: What do we mean by Food Technology in high school? This paper puts forward that students studying the subject need to be better educated in the plethora of elements and complexities of the food supply chain and associated food carbon footprint. Given Food Technology involves technological activity in nearly everything undertaken or made in the subject area, it is critical that students are exposed to the 'whole menu' as a sustainable food system, and one that is recognized by students as being able to maintain the health of people but is not wasteful of top soil, water, fossil fuels and other finite resources. Where the combination of increasing human population and resource use is costly in terms of global biodiversity, it cannot be understated that food supply chains for future generations remain a significant issue in relation to sustainability in the supply of nutritious foods, marketing, storage and transport

(Australian Conservation Foundation, 2008; Strange & Bayley, 2008, p.26; World Vision, 2009). It is therefore critical that teachers and educators form a coherent picture of sustainability in terms of food and to integrate sustainability concepts, such as the carbon cycle, that provide a more holistic and real world context to learning.

Although the science of measuring a food carbon footprint is still developing (Gaballa & Cranley, 2008; Gaballa & Abraham, 2007; Harrington, 2008), the concept of designing for example, a muffin recipe that meets the needs for a carbon footprint that is low would be promoting a 'new habit of mind' that amalgamates purpose and contextual factors, and associated tools, knowledge and material understandings for deign solutions (Newcombe & Seemann, 2008). It is argued this would be a more progressive learning approach rather than focusing on the eating and making-need alone. The question then posed is, at what scale and context should the subject be taught? i.e. Feed a family or feed a nation? This paper argues that in certain aspects with regard to the discipline, some areas of teaching appear to have reached their plateau, or state of peak knowledge, struggling if not resisting, reform and replacement with new discipline ideas and methods where new knowledge is marching on seemingly out of reach from their educational foundations. The demand on fluid intelligence, capacity to unlearn long-standing cognitive structures, and thrive with new knowledge before them is rising. These human factors when blended with detailed syllabus learning outcomes have not been conducive to promoting a sustainable education in Food Technology.

> The ultimate challenge for education, environmental or otherwise, is to prepare people with the skills and knowledge needed to identify and shape the quality of the world we share with others—human and nonhuman; in a multicultural and political world, this means education for cultural competence and political participation. Both in and outside of schools, there is currently too much complacency toward problematizing the homogenizing standard practices of general education and too much caution around taking the political stands that will be needed to reform it.
>
> (Gruenewald, 2004, p. 2)

Since the Brundtland Commission Report in 1987 *Our Common Future* (World Commission on Environment and Development), presented the principles of sustainability framed through social, economic and environment indicators, the most universally accepted definition is: 'development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (World Bank, 2001). The complex and interconnected nature of global problems under this broad definition have resulted in widely differing views by those with diverse political and personal commitments. Essentially, sustainability is "an on-going learning process" (Tilbury & Cooke, 2005, p. 3), ''a process of conscious collective evolution'' and not a matter of a few quick fixes and business as usual or pursuit of a single social value; it is continuous principled vigilance" (Harrison, 2002, cited in Elshof, 2005, p. 1). Sustainability cannot be taught as isolated or standalone content. It involves a systems thinking approach that "involves people, tools and the consumed environment, driven by purpose and contextual factors" (Seemann, 2009, p, 118). Schools as stakeholder ought have been a fundamental springboard for sustainable development, but to a large extent there has been a dislocation between the teaching research nexus and collaborative industry partnerships (Strange & Bayley, 2008; Organisation for Economic Cooperation and Development, 2000). The school institution itself needs to accommodate a fundamental shift in the current

paradigm of conventional practice for what it means when we say sustainability and food futures in technology education.

Where human-induced climate change by developed nations now prevails as an historic fact and shouldering little responsibility for lesser developed countries (International Institute for Sustainable Development, 2002; Organisation for Economic Cooperation and Development, 2007; Pearce, 2006), it makes sense that the study of Food Technology should educate our students well into the next decade for real world contexts and that students develop suitable attributes to embrace change, who can differentiate human technological practice and possess a capacity for making long term sustainable decisions. Problem solving in our own backyard would yield a fruitful exercise toward developing students as talented and innovative thinkers and doers who could be a benefit to our country and the planet. Australia for example, accounts for 1.5% global greenhouse emissions, the CO2 emissions for this country are nearly twice the OECD average and more than four times the world average (per person per capita). This is largely due to the high usage of coal in electricity generation and agricultural emissions from machinery and large numbers of sheep and cattle. Overall, Australia's agricultural prospects are not looking sustainable in the long term, with water consumption for agriculture at 65% and the burgeoning drought conditions in the Murray-Darling Basin continuing to have significant consequences for agricultural production. Drought months are projected to increase by up to 20% by 2030 and by 2070, are projected to increase by up to 40% in eastern Australia and by up to 80% in south-western Australia (Australian Bureau of Statistics, 2010, pp.15, 19, 20, 29; CSIRO and BoM [Bureau of Meteorology], 2007; Hafi, Thorpe & Foster, 2009, p. 2). As a result this will further impact on industries and farming practice through changing energy, transportation and material costs over the medium to long term, and at an economic level with regard to the national Gross Domestic Product (Australian Bureau of Agricultural and Resource Economics, 2008, pp. 2, 5). This state of play on the planet and the major tragedy that has unfolded now affects the security of water supply, food and energy, and as such demand an environmental conscience from Food Technology students. However, sustainability is barely mentioned in food curriculum.

It is argued that the proposed changes in the NSW Stage 6 Syllabus for Food Technology, one dot point for *ecologically sustainable production methods, such as organic farming* and *discussing the potential risks and benefits of using emerging technologies in food production and manufacture* (NSW Board of Studies, 2011, p.19) is simply not enough detail in the syllabus to get the message across. Additionally, the continuum from the junior Food Technology syllabus demands a re-think that better promotes a flavour for sustainability rather than a flavour for donuts and cupcakes. In a world of expeditious change and a world of great demand on all of our subjects, we need to be clearer by what is meant in the subject matter and language for the next generation of curriculum design. Where the study of Food Technology is concerned, curriculum design methods should be clear about what it means in the wider world. So when a student completes school in Year 12 and then enters a degree in Food Technology, they should feel comfortable in knowing they are studying a continuum from school based Food Technology that is aligned to the wider professional view.

Attention is drawn to the need for curriculum to align more toward a common interest for sustainable food production as a life sustaining enterprise, else for schools to re-label the subject area so as not to confuse it in a stalemate of rhetoric compared to the wider professional demand for it to rapidly evolve. If the stand off between the school view of Food Technology and the wider demand for it to evolve remains in this catatonic state, the subject area in some school systems may well erode its claim to relevance. It was this conundrum that formed the impetus for this study.

Theoretical framework

> The future is already here - it's just unevenly distributed (Gibson, 2003).

A comprehensive survey was designed to clarify sustainable Food Technology futures. Guided by Technacy Genre Theory, perceptions were gathered around contextual and goal oriented aspects of practice, with a specific interest in:

1. Human elements of practice (e.g. agency, knowledge, techniques, values, social organisation)
2. Tool elements of practice (e.g. enabling technical devices and systems)
3. Material or ecological elements of practice (e.g. consumable ingredients, properties, aesthetics, impact on ecology)

According to Seemann (2009; 2003) each element exists in a dependent relationship with the other elements of practice, and is defined via the purpose and context of application. The elements represent both resources and constraints evident in all forms of technological practice. Where an element is marginalized in favour of another, an unevenly distributed outcome prevails. Thus the objective is to arrive at a balanced view that acknowledges the heavy reliance technological choices and processes share with their social and ecological drivers. Consequently, Technacy Genre Theory takes the position that all technology education has a *duty of truth* to assure both ecological and sociological elements are carefully accounted. The ideal is a net zero or balanced outcome, where social and ecological benefits equal or exceed all other associated costs

The genre framework was designed as a conceptual tool to identify and measure inter-relationships and subtle differences between typologies of technology practice for Food Technology. Of particular theoretical interest was whether the Technacy Genre Index could detect a high degree of precision between two hypothesised genre so that the indexing system may be able to demonstrate both: 1) The existence of Technacy Genre (the existence of technology types by the comparative measures of the Technacy Genre perception index) and 2) Whether genre identification can clarify a long-standing problem in the context of Food Technology in schools, relative to the wider professional expectation of the same.

Method

The survey instrument was designed to capture quantitative and qualitative perception data. Technacy was used as an indexing system to detect different types of closely related technology practice. This was achieved through structuring Technacy Genre perception matrices about:

1) Food Technology knowledge and techniques
2) Food Technology materials and ingredients
3) Food Technology tools, and
4) Detection of co-relationships between the three elements above as evidence of

systemic Technacy Genre patterns being practiced.

The perception grids compared professional Food Technologists responses with School Teacher responses. The main school system sampled was the NSW Department of Education and Training (NSW DET) in Australia, partly because of accessibility, but also because this school system is generally regarded as one of the biggest in the world, and so has a significant mass perception impact on society both in Australia and internationally (NSW Government, 2010). The perception grid method is an adaptation from similar work used by Provost, Lipp, Bath & Hannan (2007), designed to discern psychology student views about the nature of human knowledge. This work drew on Sperandeo-Mineo's earlier studies (cited in Martin, Provost, Lipp, Bath & Hannan, 2007) that investigated the epistemological beliefs of schoolteachers about the nature of science and the relationship beliefs had with teaching expertise and academic background.

Data Sources

Data sources were selected using a stratified random sampling method. The population represented participants from two main groups: Teacher Training (n=191) and Non-Teacher Training (n=191). These were collated into four different subgroups:

A) Teacher Training: Food Technology (n=78);
B) Teacher Training: Areas other than Food Technology (n=58);
C) Teacher Training: General Secondary (n=55) and
D) Non-Teacher Training: Food Scientist Technologist, such as members of the Australian Institute of Food Science and Technology Inc. (n=191).

The Food Scientist Technologist group present as the control group. The Teacher Training group (Food Technology, Areas other than Food Technology and General Secondary), present as the diverse group. Participant types for each subgroup were identified under categories as Undergraduate student; Postgraduate student; Teacher; Academic or Food Scientist Technologist.

Results

The Teacher Training group were predominately from New South Wales (n=183). This state has the largest education system and biggest population therefore dominates both at State and National levels. Participants from other states included: Victoria, Tasmania, South Australia, Western Australia (both n =1) and Queensland (n=4). The Non-Teacher Training group represent science and innovation from an Australian professional view nationally. This group also has a high proportion of participants from New South Wales (n=99). International students were inclusive of NSW and these students offer an insight from an International perspective for the field of study. (n=46). Participants from other states included Victoria (24); Queensland (n=12); Western Australia (n=6); South Australia (n=3); Tasmania (n=1). A dominant female gender grouping was evident across Teacher and Non-Teacher Training groups. This may influence particular perceptions about Food Technology as a subject area. However, there was a higher profile of males in the Non-Teacher Training group. Teacher Training female (n=67), male (n=11). Non-Teacher Training female (n=141), male (n=50).

Both groups display a similar age distribution, therefore the interpretation of responses are comparative as to whether age influences particular perceptions about Food Technology as a subject area (n=382). There was a bi-modal figure between

years 30-49 years. This means that the teaching profession has a strong middle age continuum. However a sharp rise for 20-29 years signifies a new cycle in the teaching profession (n=191, mean=30-39 years, median=32 years, SD=1.652). There is a similar age grouping for 50-59 years compared to the Teacher Training group but a slight rise for this group specifically. This may be associated with job opportunities nationally and internationally for the 30-49 year group. A sharp rise for the 20-29 year age group signifies a new cycle in the food industry profession (n=191, mean=20-29 years, median=20-29 years, SD=1.257).

For teaching or working years both groups display multimodal data sets. For the Teacher Training group, the bi-modal figure for 5-10 years and 26-30 years may mean a twenty-five year cycle revival into the teaching profession. The bi-modal figure for 21-25 years and 31-35 years presents a similar pattern (n=53, mean=16-20yrs, median=20-21yrs, SD=1.938). Undergraduate students were not included in this question given they had not worked professionally in their chosen field (n=241). For the Non-Teacher Training group this could mean a twenty-five year cycle revival into the food science technology profession. There is also a bi-modal figure for 11-15 years and 36+ years. This suggests a generational gap of industry employees in previous years and may also be associated with job opportunities nationally and internationally for the younger groups (n=78, mean=16-20 years, median=20-21 years, SD=2.282). Undergraduate students were not included in this question given they had not worked professionally in their chosen field (n=241). In cases for both groups, the majority of participants were in full time employment. (Teacher Training group 85.5% and Non-Teacher Training group 92.4%). The nature of the respondents' full time employment brings practicing currency and an experienced view to the survey (n=141). Undergraduate students were not included in this question given they had not worked professionally in their chosen field (n=241).

Sixty-one degree types containing various specialisations were grouped into common themes representing areas of study for the Humanities and the Sciences. Where the Humanities places less emphasis on the study of a discipline but more about experiencing interesting things, the Sciences on the other hand are largely driven through investigation and innovation and where explicit content and methods are not sacrificed. This sought to frame whether the type of educational background influences particular perceptions about Food Technology as a subject area (n=371). Two contrasting themes were evident that signify implications for the study of Food Technology given the type of educational background of the participants and subsequent opposing views of discipline. Teacher Training: Humanities (n=162), Sciences (n=190); Non-teacher Training: Humanities (n=0), Sciences (n=191). A very small proportion of participants had undertaken a TAFE–University combined qualification. These included two participants with a Food Certificate qualification, one Teaching Certificate qualification and one participant having completed an Accelerated Teacher program (n=4).

Although a larger proportion for participants with no Food major presented for the Teacher Training group, it is important to highlight while those who are not trained in Food Technology have taught Food Technology in schools. Their view of the subject area is important as they offer a perception of their colleagues work (n=131).

Key Results: A high Technacy Genre Index approaching 1.0 suggests a strong science, innovation and food design orientation; a low index approaching 0.0 suggests strong vocational, cooking-skills, conservative orientation to the purpose and practice of Food Technology. Alpha = 0.05, n=382.

The research found that Teachers perceived priority systems of Food Technology materials, knowledge and tools substantially and significantly differently to the wider professional community of Food Technologists: Knowledge: Teacher index= 0.31 vs. Technologists Index=0.81 (both n=191, t=-23.614, df=380, p<0.000, 2-tailed); Tools: Teacher index=0.21 vs. Technologists Index=0.82 (both n=191, t=-28.284, df=380, p<0.000, 2-tailed); Materials: Teacher index=0.15 vs. Technologists Index=0.65 (both n=191, t=-18.949, df=380, p<0.000, 2-tailed). An unexpected result showed that, despite the sub-group of general secondary teachers with no training in either Food Technology or any other technology field, their overall Technacy Genre Index shows better agreement with the genre practiced by the wider food technology profession than with food technology and general technology trained teachers in schools. Food Knowledge: Non-technology teacher index for Food Knowledge =0.37; Food Teachers index=0.32; Food Technologist index =0.81. Food Tools: Non-technology teacher index for Food Tools =0.29; Food Teachers index=0.20; Food Technologist index =0.82. Food Materials: Non-technology teacher index =0.21; Food Teachers index=0.13; Food Technologist index =0.65. On the issue of evidence for coherence in genre co-relationships existing between food materials, tools and knowledge, the results of a Pearsons 3x3 correlation matrix (Figure 1) shows there is a very strong three-way interdependent pattern, as predicted in Technacy Genre Theory: Knowledge-Tools (n=382, r=0.823, p<0.000, 2-tailed); Knowledge-Materials (n=382, r=0.742, p<0.000, 2-tailed); Tools-Materials (n=382, r=0.790, p<0.000, 2-tailed). On all measures, fellow non food, and 'other field' technology trained teachers scored the lowest in their perceptions of what Food Technology education entails compared to the rest: Knowledge index=0.26; Tools index=0.15; Materials index=0.11.

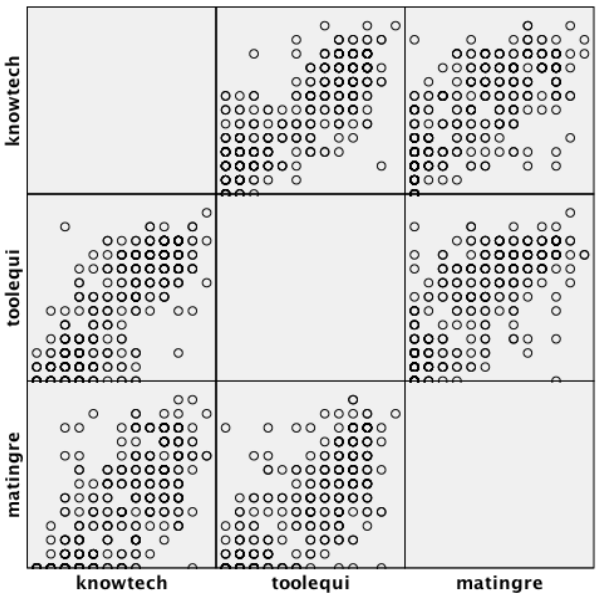

Figure 1: Technacy index correlation for knowledge, tools and ingredients

Food Technology as an area of study

A Likert Scale of twelve questions asked respondents for degrees of agreement for the purpose and practice of Food Technology as an area of study. A Technacy Genre Index score of 4-5 for six of the questions suggests a strong science, innovation and food design orientation theme with the other 6 questions suggesting a strong vocational cooking-skills and conservative orientation theme. One independent question sought to clarify whether schools offered Food Technology for the senior years with a view to detect teacher willingness to teach the subject. Alpha=.05, n=325. In summary the questions included:

- Food Technology syllabus representation and educator interpretation
- Educator technology genre values and willingness to promote / teach the subject
- Food Technology as a valued and scholarly subject area in education
- Perceived practical learning activities for the study of Food Technology
- Depth and breadth of sourced literature
- Creative enterprise through visualisation and mental imagery

The research found that teachers perceived the educational value of Food Technology as substantially and significantly different to the wider professional community of food technologists. There is no alignment between two worlds, i.e. inside the school world compared to the wider professional community of Food Technologists (Figures 2 & 3). This confirms both groups hold opposing views around what constitutes the study of Food Technology. For VET: Teacher index=3.16 (n=171) vs. Food Technologist index=2.29 (n=154); (df=1, F=49.907, p<.000). For science: Food technologist index=3.32 (n=157) vs. Teachers index=2.90 (n=158); (df=1, F=13.457, p<.001).

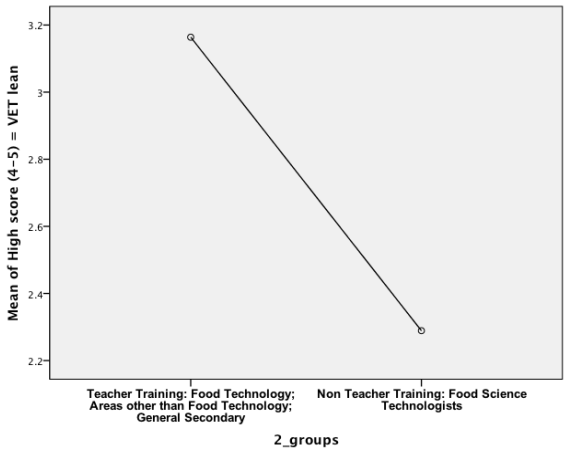

Figure 2: VET index both groups

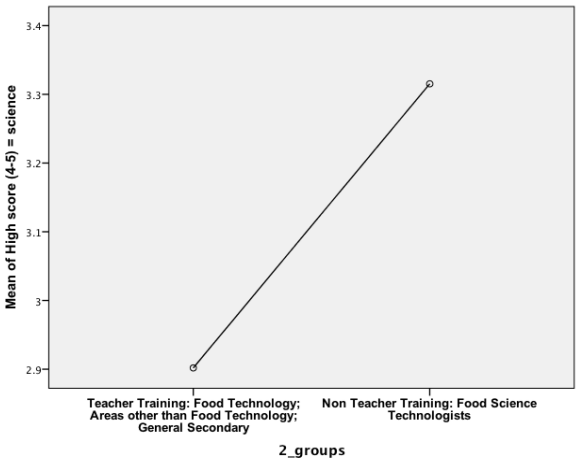

Figure 3: Science index both groups

The area is confused amongst the teachers but not the food technologists. There appears to be contradictions amongst the teachers for where the subject is sitting currently and where the subject needs to go. An unexpected result showed that, despite the sub-group of teachers who teach in areas other than Food Technology (and who may not be trained in Food Technology but may teach the subject), shows better agreement with the wider professional community of Food Technologists (Figure 4).

This may mean that they see the subject currently in a VET domain but also see the subject to be more science driven, and therefore what domain it needs to go to in future. The Food Technology teachers compared to their colleagues in the same faculty do not present as a culture that are engaged in evolving their subject matter (Figure 5), or evolving as a science based discipline. For VET: General secondary index=3.39 (n=48); Food teacher index=3.23 (n=75); Areas other than food technology index=2.84 (n=48). Non-Teacher Training: Food technologist index=2.29 (n=154). (df=3, F=18.908, p<.000). For science: Food technologist index=3.31 (n=157); Areas other than food technology index=3.27 (n=42); Food Teacher index=2.80 (n=69); General secondary index=2.72 (n=47). (df=3, F=5.709, p<.001).

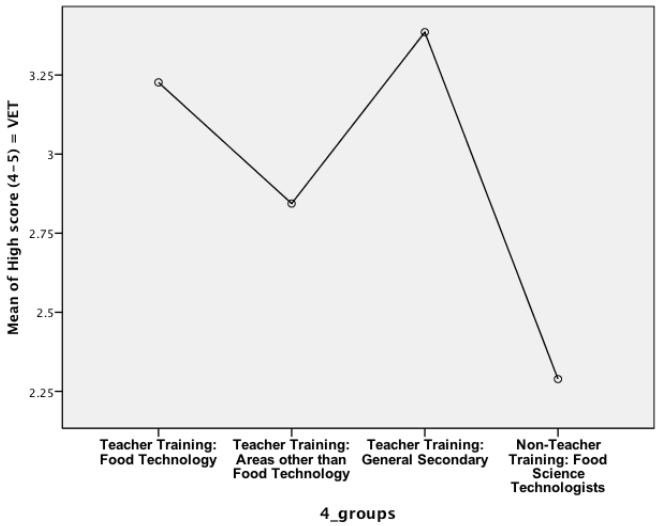

Figure 4: VET index four groups

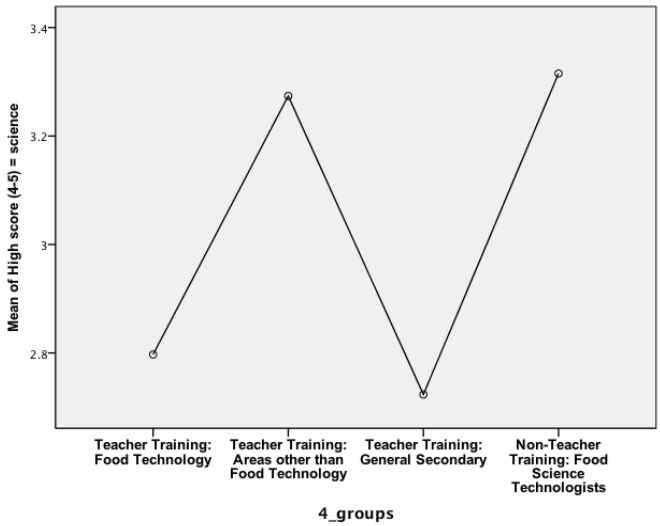

Figure 5: Science index four groups

A break down of the questions reveal that teachers viewed the subject as ***offering a relevant pathway into Hospitality*** compared to the wider professional community of Food Technologists. Teacher Training (n=152; Teacher index=4.00) vs. Food Technologist Training (n=114; Food Technologist index=3.31); (df=1, F=31.733, p<.000). The teachers also viewed the junior ***Food Technology years 7-10 syllabus as learning for self-sustainable life skills involving practical cooking lessons.*** Teacher Training (n=164; Teacher index=4.11) vs. Food Technologist Training (n=125; Food Technologist index=3.06); (df=1, F=73.840, p<.000). Therefore, ***associated school syllabus textbooks and magazines*** were seen to be more useful than ***journals for the study of Food Technology***. Teacher Training (n=119, Teacher index=3.68) vs. Food Technologist Training (n=115, Food Technologist index= 2.99); (df=1, F=19.609, p<.000).

The teachers did not see a need for students ***to demonstrate strong science and math skills to study Food Technology at a secondary school or at a teacher training level:*** Teacher Training (n=116, Teacher index=3.01) vs. Food Technologist Training (n=124, Food Technologist index= 3.85); (df= 1, F=37.778, p<.000), and as such did not see why any importance should be placed on ***controlled research and hypothesis testing:*** Teacher Training (n= 122, Teacher index=3.59) vs. Food Technologist Training (n=139, Food Technologist index=3.87); (df=1, F5.103, p<.025). Additionally, teachers did not agree that it is ***important to undertake experiments***

compared to chemistry and biology subjects: Teacher Training (n=156, Teacher index=4.04) vs. Food Technologist Training (n=159, Food Technologist index=4.28); (df=1, F= 6.384, p<.012). However, teacher participants responded that the study of Food Technology provided an ***excellent foundation to learn food science and technology.*** This latter perception contradicts the previous responses and shows deep confusion, or misperception, amongst the teachers for what constitutes the study of Food Technology compared to the wider professional community's understanding of it. Teacher Training (n=98, Teacher index=3.73) vs. Food Technologist Training (n=99, Food Technologist index=3.28); (df=1, F=8.708, p<.004). The career cycle where school ***students choose Food Technology in senior years because they want a career as food technology teachers*** suggests a closed loop is evident. This loop starts, proceeds and finishes back in the school teaching environment. A student perception at school often leads to a career choice as a food technology schoolteacher, and this in-turn results in 'food technology' schoolteacher graduates returning and reinforcing the original school perceptions developed about what constitutes the study of Food Technology. The historical opportunity for the wider community of professional Food Technologists to interrupt the perception cycle appears to be modest if not weak. The pattern gives weight to anecdotal concerns by Food Technologists that the school view is not evolving at the natural pace of the subject's evolution in the wider profession, a problem already identified as negatively affecting first year enrolment patterns into undergraduate Food Technology courses targeting the wider career of food technology and innovation. Teacher Training (n=122, Teacher index=3.04) vs. Food Technologist Training (n=99, Food Technologist Index=2.58); (df=1, F=8.664, p<.004).

Paradoxically, 'food teachers' were ***aware of the National Food Industry study*** compared to the wider professional community of Food Technologists. This poses an interesting conundrum that although the food teachers may have been aware of the study which offered knowledge and insights to the contemporary knowledge and practice in the field of study, the data presented suggests that they have ignored the findings. Teacher Training: Food teacher index= 2.47 (n=57); Areas other than Food Technology index= 1.95 (n=39); General secondary index=1.46 (n=35). Non-Teacher Training: Food technologists index= 2.30 (n=256). (df= 3, F= 6.965, p<.000).

The following data did not show significant responses at alpha set to .05, but shows a trend towards alpha consistent in theme with the significant data presented thus far. Food teacher perceptions are that students *do not take up* the subject because they see it as a ***job pathway to become a food technologist***. As can be seen by the scores in Figure 6, often other schoolteachers not trained in Food Technology teaching, respond on items more in agreement with the wider professional view of Food Technologists. This signals confusion amongst the inside world of the teaching profession between food technology teachers and their teaching collegiate for where the subject is sitting currently and where the subject needs to go. An unexpected result for studying ***eco-sustainability, synthetic foods, naturopathy and bush food nutrition*** showed that the food industry, possibly undervalue this area and is perhaps more 'mainstream' market driven. Teacher Training: Areas other than food index=4.06 (n=34); General secondary index=3.91 (n=33); Food teacher index=3.60 (n=55). Food Technologist Training: Food technologists index=3.52 (n=113). (df=3, F=2.848, p<.038). Whether students choose to study food technology in their senior years of schooling is a decision largely driven by syllabus representation, teacher interpretation and their

willingness to teach the subject. A pattern of responses shown in Figure 6, suggest that food technology is not greatly supported by food teachers as much as it could be. Teacher Training: General secondary index=3.84 (n=19); Food teacher index= 3.51 (n= 53). (df=3, F=1.851, p>.140). This trend aligns with current 2009 archived statistics from the NSW Board of Studies where only 3,477 students studied Food Technology in the Higher School Certificate year compared to 6,584 students who studied Hospitality with an exam and 7,628 students who undertook Hospitality without an exam.

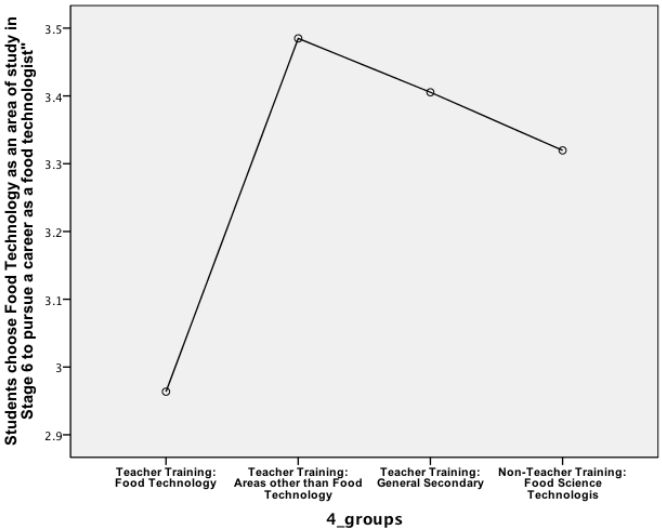

Figure 6: Perceptions for students taking Food Technology as a career pathway to the food science industry

Reasons for teaching Food Technology in secondary schooling

Thematic analysis of text was undertaken from the qualitative survey section. These were framed using Technacy Genre headings: Human Agent (knowledge), Tools and Equipment, Ingredients and Materials. From the category of knowledge, what came out were five identifiable themes:

1. Social life skills
2. Gender and culture
3. Nutrition and health
4. Science and research
5. Ecology and sustainability

For Tools and equipment, two identifiable themes were evident:

1. Cooking and food processing
2. Experiments and food processing

For Ingredients and materials, three identifiable themes were evident:

1. Food sustainability
2. Health and nutrition
3. Food safety and quality

If we can read anything into the following graphs, there is a significant and substantial difference for the reasons why Food Technology is taught in school between the two groups for knowledge (Figures 7 & 8). Both groups present a strong theme for either vocational operational skilling or science, in particular for knowledge and tools

(Figure 9). However there were closer parallels between the two groups with regard to materials and ingredients, although the Teacher Training group shows a strong lean toward nutrition (Figure 10).

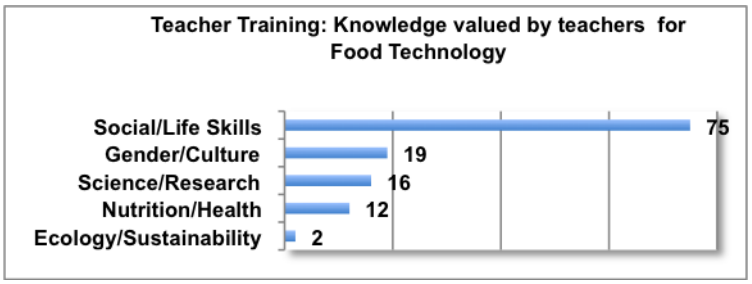

Figure 7: Knowledge valued by teachers for Food Technology

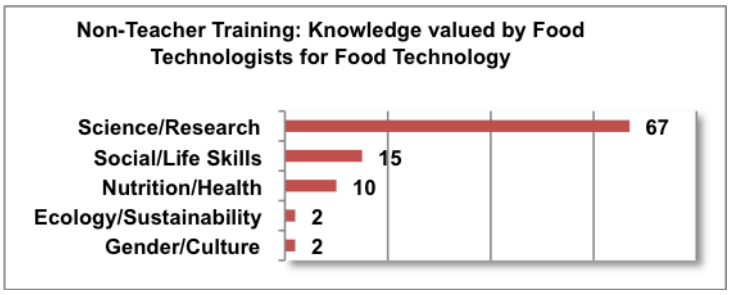

Figure 8: Knowledge valued by the wider professional world

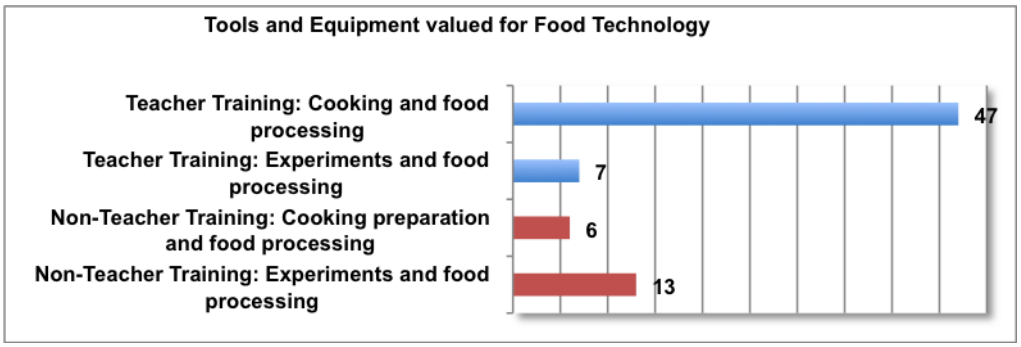

Figure 9: Tools and equipment valued for Food Technology

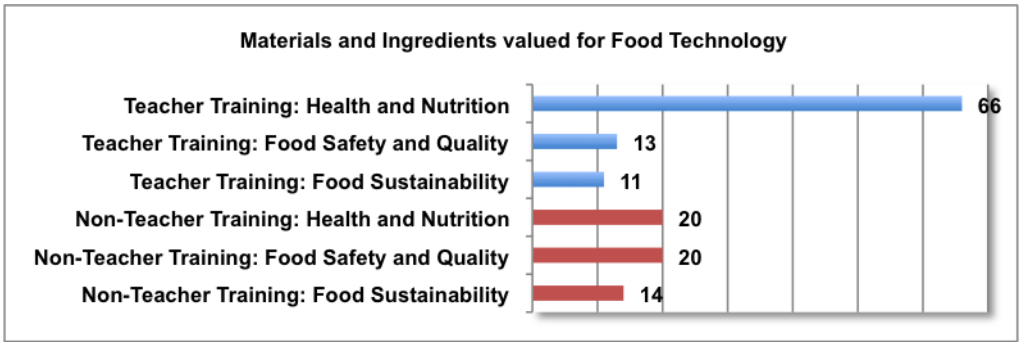

Figure 10: Materials and ingredients valued for Food Technology

The message from this paper equals 'balance'. How can we make food technology sustainable as an area of study when there is so much confusion around the subject area? The data has made transparent that there is a major disagreement in values between secondary Food Technology teachers and the wider professional community of Food Technologists. Historically, there has been an isolated 'habit of mind' created in Technology Education and Food Technology collectively. Although our technological decisions do not necessarily provide immediate feedback for the benefits of climate change, students need to be able to discern that what we are trying to do in Food Technology education should embrace the greater good for both people and ecology. Recipe racing and eating food with little real world problems explored does nothing more than substantiate a lacking in governance for the capacity to make decisions for sustainable food futures.

This study suggests that the theory underpinning the Technacy Genre Index offers a valid new branch of Technology Education classification and line of research. Educationists can legitimately explore forms of technology practice by way of the Technacy Genre Theory. The use of this index has helped clarify the likely existence of two significantly different Technacy Genre between the school practice of the subject and the wider professional view of it. If used appropriately, Technacy Genre Theory can substantially help evolve and improve teacher education and curriculum design in technological thinking and learning. These findings also explain a likely reason why many Australian Food Technology undergraduate degrees have expressed concern for a huge dropout rate in the first year of high school leavers who have come from a 'food technology' course in their secondary studies. The research concludes that, schools and the wider professional community, practice very different forms of Technacy Genre, even though they both use the same labels for their practice.

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