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Experiential learning for engaging nutrition undergraduates with sustainability

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1 Experiential learning for engaging nutrition undergraduates with sustainability

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13

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15

16 **Abstract**

17

18 **Purpose**

19 This paper describes students' self-reported learning from engaging in an experiential
20 learning task designed to develop their understanding of sustainable food systems and dietary
21 practices.

22

23 **Design/Methodology/Approach**

24 One hundred and forty three first year students enrolled in an entry level food and nutrition
25 subject undertook a three week eco-friendly food challenge (1. Reduce food (& food related)
26 waste; 2. Localise food purchases; 3. Eat seasonally & sustainably; or 4. Reduce meat
27 consumption). They blogged about their experience and responded to an action-orientated
28 reflective question each week. Content analysis of the blogs was undertaken using NVivo 10.
29 Content was systematically coded and categorised according to action/activity, learning and
30 response to reflective questions.

31

32 **Findings**

33 Students reported undertaking a range of self-selected practical activities throughout the
34 challenge. Self-reported learning suggested students gained self-awareness and knowledge,
35 and demonstrated problem solving abilities. The importance of planning and preparation was
36 the most common theme in students' blogs when responding to the action-orientated
37 reflective question in week one. In week two students identified socially-mediated barriers
38 and the time and energy required to undertake their challenge as the most likely barriers
39 preventing others engaging in more sustainable food behaviours. They provided advice and
40 solutions to overcome these barriers. In week three a range of community, government and
41 multi-sector initiatives to support consumer food-related behaviour change were identified.

42

43 **Originality/Value**

44 This approach presents a possible means for engaging nutrition undergraduates with
45 environmental sustainability.

46

47 **Key words** Sustainability, experiential learning, nutrition education, blog, undergraduate.

48

49 **Paper type:** Research paper

50 **Introduction**

51

52 Food security and population nutrition needs are closely associated with and reliant on a
53 stable and sustainable food system (Rayner and Lang, 2012b). There is growing recognition
54 of the challenges climate variability, loss of biodiversity, and unsustainable food system
55 amongst other related issues, are posing to national food security and food equity (Edwards et
56 al., 2011, Macdiarmid et al., 2012). An ecological perspective of public health nutrition
57 demands consideration and active engagement with the challenges of supporting
58 environmentally sustainable and secure food systems (Cannon and Leitzmann, 2005, Rayner
59 and Lang, 2012a, O'kane, 2012).

60

61 These challenges require the development of a nutrition workforce that is both critically
62 aware and adequately equipped to actively engage in contributing to and providing leadership
63 in addressing these issues. An intentional approach to build the capacity of the workforce is
64 needed. Until recently there has been a general lack of engagement within nutrition science,
65 and more specifically dietetics (Wilkins, 2009, Wilkins et al., 2010), with the structural
66 aspects of the food system which intersect with eating practices and dietary guidance.
67 Wilkins et al (2010) suggest knowledge and skill development, specifically in dietetics
68 training, is needed to engage the profession in systems thinking. This involves viewing eating
69 and food with an holistic framework which includes the sustainability imperative (Wilkins et
70 al., 2010).

71

72 While research suggests that Dietitians perceive the importance of issues relating to the food
73 supply and sustainability, and the need to incorporate this into their practice (Wilkins, 2009,
74 Robinson and Smith, 2003), two studies investigating current training practices indicate there
75 is significant variability in the opportunities available for students to be exposed to and
76 develop understanding of the food system and sustainability issues (Robinson and Smith,
77 2003, Harmon et al., 2011). Where provided, it appears that both didactic and experience
78 based approaches are being used (Webber and Sarjahani, 2011). Available literature
79 regarding sustainability pedagogy in nutrition and dietetics to date has been generated in
80 America, however it is expected that there are similar issues encountered in Australia. There
81 appears to be little or no scholarship within nutrition and dietetics regarding student

82 engagement and learning resulting from approaches to sustainability pedagogy. In addition,
83 there are a range of challenges relating to incorporating sustainability into practice (Robinson
84 and Smith, 2003) and guidance systems, as well as a lack of knowledge among practitioners
85 (Harmon et al., 2011). As such, enhancing student learning in this area may contribute to
86 improving the profession's response to these important but complex issues.

87

88 One method of engaging students with sustainability may be through the use of experiential
89 learning. The theory of experiential learning suggests that learning takes place through the
90 interplay between acting, experiencing (feeling), thinking and reflecting (Kolb and Kolb,
91 2005). This approach posits that experience when coupled with reflection will contribute to
92 deeper learning than what may be seen with pure theoretical learning. The reflective stage
93 encourages students to reflect on their learning and outcomes, and has been reported to be an
94 effective vehicle for providing learning experiences to nutrition and dietetic students
95 (Palermo et al., 2009, Leveritt et al., 2013, Bohn and Schmidt, 2008, Barr et al., 2002). While
96 there are various approaches that can be used, one method recognised for the development of
97 reflective skills is the use of journaling (Dyment and O'connell, 2011). Journaling can be
98 completed online through the use of blogs ('web logs') which are an "online, chronological
99 collection of personal commentary and links" [p.1339] (Wetmore et al., 2010), that usually
100 include images, videos and photographs, as well as the opportunity for other participants to
101 comment on the blog content. While the use and evaluation of blogging in the educational
102 environment is relatively new, blogs have been shown to assist students with reflective and
103 critical thinking skills (Williams and Jacobs, 2004, Ladyshevsky and Gardner, 2008, Bouldin
104 et al., 2006). In this study we plan to describe students' self-reported learning from engaging
105 in an experiential learning task designed to develop their understanding of sustainable food
106 systems and dietary practices.

107

108 **Methods**

109 All students undertaking a first year food and nutrition related course¹ at the authors'
110 university were required for assessment to engage in an 'eco-friendly food challenge' over
111 the course of three consecutive weeks. The 'eco-friendly food challenge', developed by a

¹ At the authors' University students complete a predetermined number of courses to graduate with a Bachelors program (degree). The course used in this study is a required (compulsory) course for all students enrolled in the Bachelor of Nutrition and Bachelor of Nutrition and Dietetics. Students enrolled in other programs may complete this course as an elective.

112 community nutritionist and her team in Queensland Australia, aims to engage the community
113 in learning about and developing sustainable food practices. The program was based on four
114 challenges: 1. Reduce food (& food related) waste; 2. Localise food purchases; 3. Eat
115 seasonally & sustainably; 4. Reduce meat consumption (Nutrition Promotion Unit (Metro
116 South Health Service District Qhealth) et al., 2010). Students were required to self-select one
117 challenge to implement over this time and were given the flexibility of deciding on their own
118 task for each week. They were required to set a task-oriented goal for the week, implement
119 related activities and then blog about their experience at the end of the week guided by a
120 reflective framework and weekly reflective question. These challenges, given their breadth,
121 provided students with significant latitude in the types of activities they could undertake.
122 Students were also required to participate in the blogging community by commenting on
123 other students' blog posts however this aspect of the task is not reported.

124

125 Learning and teaching activities that accompanied this assessment task included: 1. Lecture
126 on sustainability and the food system from a specialist dietitian working in this area; 2.
127 Tutorial on the blog genre, use of the blog function on the university's online learning
128 platform; 3. Detail on each challenge referring to the eco-friendly food challenge website and
129 links to key resources; 4. Tutorial on reflection and writing according to Borton's reflective
130 framework (Borton, 1970), to scaffold student reflection. The eco-friendly food challenge
131 website included ideas of tasks students could undertake as part of their assessment however
132 students were encouraged to investigate issues of personal interest. This approach aligns with
133 adult learning theory (Merriam, 2001). Group formative feedback was provided following the
134 first week and focused on the assessment task criteria of; expression of ideas and originality,
135 extent and depth of reflection, response to set questions, writing style and
136 community/participation. Students were required to submit three blogs in total however
137 students choose the blog they perceived as their best (based on the assessment rubric) to be
138 marked.

139

140 Prior to the task all students enrolled in the course were provided with information regarding
141 the study and consent was obtained by an anonymous 'opt out' approach through a third party.
142 In this process, students were required to email a third party if they did not want their blogs
143 included in the analysis. As all students enrolled in the course agreed for their blogs to be
144 analysed, blogs were downloaded from the online platform, de-identified and prepared for

145 analysis once all submissions had been marked and returned to students. However, only
146 complete blog posts were included for analysis.

147

148 A descriptive qualitative content analysis of blogs was used to achieve the objectives of this
149 study (Morgan, 1993). Data was treated as discrete descriptive insights into students'
150 experiences and opinions and were analysed to provide a descriptive account of this and
151 quantify the phenomenon. NVivo 10 was used to manage data and facilitate literal content
152 analysis (Welsh, 2002). Blogs were initially sorted into the 4 eco-food challenges and
153 grouped by week. Blog posts were then systematically coded and categorised according to the
154 following framework:

- 155 1. Action/activity (what the student did) [what?]
- 156 2. What was learned (students' reflection on learning, challenges and importance of the
157 experience) [so what?]
- 158 3. Response to reflective question [now what?]

159

160 Decisions regarding codes and categories to use were undertaken collaboratively between
161 authors. Where appropriate, subsets of data were analysed independently by both researchers.
162 Cross checking of independent analysis was undertaken to ensure consistency of analysis
163 (Fade and Swift, 2011). Given the number of blogs analysed, data was enumerated and
164 presented in tables as deemed appropriate. Quotes are used in the text below to provide
165 insight into the words and tone used by students, and provides illustrative examples.

166

167 This study was conducted according to the guidelines laid down in the Declaration of
168 Helsinki and all procedures involving human subjects were approved by the University of the
169 Sunshine Coast Human Research Ethics Committee.

170

171 **Results**

172 A total of 143 students were enrolled in this course with the majority female ($n = 122$, 85%).
173 The majority of students were enrolled at the time of the study in either the Bachelor of
174 Nutrition or the Bachelor of Nutrition and Dietetics. Over the three weeks of the challenge, a
175 total of 402 blogs were submitted (week one; $n = 134$, week two; $n = 137$, week three; $n =$
176 131). Of these, 125 blogs were submitted for Challenge one, while 73, 41 and 156 blogs were
177 submitted for Challenges two – four, respectively. Eight blogs did not provide a clear
178 indication of what challenge was undertaken.

179

180 *Activities and learnings*

181 Over the course of three weeks, students engaged in a number of self-selected activities based
182 on their weekly goal. Activities described by students that were common across challenges
183 were changing food purchasing habits, experimenting with new foods and recipes, planning
184 and becoming more organised and undertaking research to become more informed (Table 1).

185 The most commonly reported activity for challenge one was composting or repurposing food
186 related waste. This included activities such as building Do-It-Yourself (DIY) compost bins or
187 worm farms, finding creative ways to use food scraps in recipes or as beauty products, and
188 using a recycled waste bin(s). The following quote shows how one student addressed food
189 waste through becoming more organised:

190 *'To help enforce new measurements to better our storage methods and make food last*
191 *longer I wrote up a list of rules and stuck it to the fridge. With each rule came a*
192 *reason why the rule had been established. The new storage implementation has*
193 *helped reduce the amount of packaging and old food that we throw away. The rules*
194 *included:*

- 195 • *Remove all vegetables, herbs and mushrooms from plastic bags – this is done*
196 *to prevent them 'sweating'.*
- 197 • *Do not throw away any airtight containers such as margarine containers,*
198 *takeaway containers and jars. These are the perfect storage device for leftover*
199 *foods, dry ingredients (flour, rice etc.) and leftover liquids.*
- 200 • *Keep fruits as separated as possible. When some fruits ripen, they release a*
201 *gas called ethylene. This gas can cause other fruits to become spotted and*
202 *soft.'* [Student 2559_2_3]

203

204 Changing food purchasing habits was the most commonly described activity by students
205 undertaking challenges two and three. Students often described avoiding large grocery chain
206 stores as well as investigating where local, seasonal and sustainable food could be purchased.
207 Students also reported trying new recipes using seasonal ingredients as well as growing their
208 own food (e.g. researching and setting up herb/vegetable gardens).

209

210 Reducing the type of meat and/or the total volume of meat consumed was the most common
211 activity described by students working on challenge four. Students described reducing their
212 red meat consumption in particular. Some students (n=35) chose to have one or more meat

213 free days during the week, while others reported having one or more meat free lunch or
 214 dinner meals during the week (n=23). Seventeen students also reported ‘going’ vegetarian for
 215 a week or more for this challenge. The following student extended the challenge to include
 216 her family:

217 *‘My SMART goal ... was to cut out all meat, come up with a vegetarian recipe every*
 218 *day and substitute three of my families’ meaty meals with vegetarian ones’.* [Student
 219 1481_5_3]

220 Students described implementing strategies such as undertaking further research to ensure
 221 that the nutrients normally consumed in meat were included in the diet through other foods.
 222 Replacing protein with non-meat options became a concern for some students. Students
 223 reported experimenting with protein sources such as legumes, tofu and meat analogues which
 224 were previously unfamiliar to many of them, as well as familiar sources such as eggs and nuts.
 225

226 Table 1. Activities undertaken by students over the three week period.

	Total	C1	C2	C3	C4
Assess usual practices	26	10	-	1	15
Change eating practices	34	25	-	7	17
Change food purchasing habits	114	48	45	20	1
Compost & repurpose food waste	58	55	1	2	-
Experiment with new foods & recipes	38	8	4	4	22
Grow your own produce	15	4	6	5	-
Modify food storage habits	10	10	-	-	-
Planning & organisation	35	27	2	2	4
Proactive use of reusable equipment	20	20	-	-	-
Reduce type and or volume of meat consumed	100	-	-	-	100
Sharing the challenge with others	14	11	1	-	2
Undertake research to become informed	95	31	35	10	19

227

228 Students' self-reported learnings were similar despite undertaking different challenges
 229 (Table 2). Learnings reported within the first week of the challenge were predominantly
 230 related to realising how unsustainable their current practices were, e.g. level of current meat
 231 consumption and total amount of food-related waste produced. One student confessed,

232 *'I'm not sure whether to feel proud given the difference I have already made to*
 233 *reducing food waste in my household by recycling...or embarrassed because I waited*
 234 *so long to start and realizing how much waste we (well, OK, mainly me) actually*
 235 *produce!'* [Student 2306_61_1]

236 Students reported increased knowledge gained through additional research, e.g. learning
 237 about substitute foods and how to use them, and about the issue of food waste and creative
 238 solutions to reduce this waste. Students' descriptions of what they learnt in weeks two and
 239 three were more diverse, yet specific to the challenge with deeper reflection. For example
 240 students developed knowledge of local food producers, retailers and current education
 241 activities within the community; the social benefits of connecting with food producers (e.g.
 242 learning to appreciate farmers and understand their motivations); sustainable practices (e.g.
 243 how to compost and repurpose waste), and the personal skills and resources required to be
 244 more sustainable (e.g. being organised, budget constraints).

245

246 Table 2. Learnings according to challenge

Generic learning*
<ul style="list-style-type: none"> ● Identifying broader determinants of people's habits ● Cost implications of engaging in a challenge ● Developed awareness of personal benefits of the challenge ● Personal learning through the process ● Deepened learning on a related issue ● Realising current practices are poor compared to environmental ideals ● The need to plan & be organised ● Social nature of food and eating ● Perceived burden or ease of the challenge ● Managing the challenge during non-routine events
Challenge 1
<ul style="list-style-type: none"> ● Food storage solutions facilitate reducing food waste ● Learning about food waste and related solutions

Challenge 2:

- Learning the realities of sourcing local food
- Social benefits of connecting with food producers
- Observing the differences between local and store bought food
- Awareness of availability of local food producers & retailers

Challenge 3:

- Learning about seasonal and sustainable practices
- Perceived improved taste of seasonal & or sustainable food

Challenge 4:

- Learning about vegetarianism
- Awareness of the sensory related implications of reducing meat consumption
- Learning about nutrient needs and non-meat sources

247

248 *generic learnings → Learning the information despite the challenge; code relevant to two or
 249 more challenges; and/or the learning is not clearly related to a specific challenge.

250

251 *Reflections - Week one*

252 In response to the action-orientated reflection question posed in week one ('based on what
 253 you have learnt and experienced this week, what advice would you pass on to someone
 254 undertaking the same goal you set yourself for the week?'), the majority of advice provided
 255 by students was generic and non-specific to the challenge (Table 3). For example, advice
 256 regarding planning and preparation was provided by students undertaking all four challenges.
 257 Students realised how important being organised and planning was in order to change their
 258 food procuring, preparing and consuming habits. Implementing their goals required
 259 forethought and highlighted to many students how the current food system is not very
 260 supportive of sustainable food practices. Students provided detailed statements that described
 261 the advice that they would pass on to someone else based on their own learning and
 262 experience. For example;

263 *'planning ahead also gives you a better chance of success, planning and preparing*
 264 *your day-to-day meals will not only save you time but will also remove any risk of ad-*
 265 *hoc meals which have the potential to only provide red meat options'* [Student
 266 2306_42_1]

267

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279 Table 3: Advice provided for each challenge in response to the week 1 action orientated
280 reflective question.

	Challenge and Advice provided
Most common (>6)	Generic (non-specific to challenge)
	Plan meals and prepare ahead of time Get informed on the issue to understand its importance Monitor your current practices to increase your awareness Use household members or friends for support and accountability Use the internet, recipe books or friends to expand your repertoire of recipes Ask questions to become informed about food origin and production methods
	Challenge 1
	Strategies to reduce food packaging
Common (2 – 5)	Generic (non-specific to challenge)
	Seasonal and or local food is more likely to be found at a local market Experiment with and be open to trying new foods Learning activities help develop generic academic skills Put strategies in place to enable you to change habits Start small when changing your dietary practices Be prepared to invest more time in food procurement
	Challenge 1
	Repurpose food scraps and leftovers Choose to use reusable or recyclable food packaging

	Use appropriate storage to prolong shelf life
	Challenge 3
	Be mindful of the small ways to practice sustainability
	Challenge 4
	Source other non-meat foods to maintain dietary balance
Uncommon (1)	Challenge 2
	Be realistic how you define local food Here are tips for improving your local shopping experience
	Challenge 3
	Growing vegetables is slow going and requires persistence
	Challenge 4
	Soak and sprout for fart free beans

281

282

283 *Reflections - Week two*

284 In week two students were asked to incorporate the action-oriented reflective question ‘based
285 on what you have learnt and experienced this week, what barriers would prevent other
286 students from undertaking your challenge and what could be done to address these barriers?’
287 into their blog post. The most commonly reported barriers in week two were related to social
288 situations, with common themes including; managing the challenge in social settings and
289 living in shared accommodation. Experiences such as attending a barbeque as a ‘new’
290 vegetarian was confronting for some, while others found they lacked food knowledge and
291 preparation skills required to fully undertake the weekly challenge. The time and energy
292 required to undertake the challenge was also a common barrier, as was cost (Table 4).
293 Students also provided advice and solutions to overcome these barriers. For example;

294 *‘The high cost of [non-meat] protein rich foods may serve as a barrier for other*
295 *students undertaking this same challenge. As a student, I have to budget my expenses*
296 *and generally would not be able to spend \$8 on a bag of almonds. There are, however,*
297 *cheap alternatives to nuts and seeds. Beans are relatively inexpensive yet high in*
298 *protein’. [Student 2434_27_2]*

299

300 *'My biggest suggestion for this is to be adventurous with your meals! Look up new*
 301 *ways of doing things on the internet and in cook books to challenge yourself and*
 302 *explore what's out there. However, remember the biggest thing is to not be afraid to*
 303 *try new things'.* [Student 2324_32_2]

304

305 Table 4: Common barriers and advice reported in response to the week 2 action orientated
 306 reflective question.

307

Common barriers encountered	Advice & solutions
Socially mediated barriers [*]	Time market visit for quieter periods, shop alone or be clear about intentions, active involvement in family food provision, communicate with friends & family to gain support, ask about retail produce origin, be proactive in social situations, plan ahead, take the opportunity to try vegetarian meals
Time and energy required to undertake challenge	Prioritise activity, plan meals ahead of time, pre-prepare meals, share food procurement with others
Cost related barriers [‡]	Buy in bulk, prioritise foods to purchase (need vs. want), purchase food at local markets, research cheap ways to compost, share food costs with others, shop at markets when prices have been marked down, use staple foods to reduce overall cost of meal, using beans as a low cost vegetarian source of protein, buy less but better quality, research discounts and cost saving opportunities
Limitations of housing related infrastructure and personal resources	Grow vegetables/herbs in pots, provision of public transport, share/utilise resources with family or friends, trial alternative composting locations
Lack of knowledge [‡]	Research and try new recipes, research and experiment with new recipes/foods, make resources on seasonal food available
Habitual nature of current practices	Buy only what you need to reduce the temptation, find meat substitutes with similar sensory qualities, use reminders/cues
Lack of reason or motivation to change	Become informed about the issue
Poor availability and access	Share/utilise resources with family and friends, use a food

of farmers markets	delivery option
Lack of preparation and intention	Become mindful of shopping practices, plan out meals and ingredient needs, share extra food with others
Concern about adequacy of dietary intake	Choose a variety of foods high in key nutrients

308

309 * Includes: Inconvenient for farmers to answer questions about produce, influence of others
 310 when shopping, living in shared accommodation, and managing the challenge in social
 311 settings

312 [±] Includes: Budget and higher prices for Australian produce

313 [‡] Includes: Knowledge about composting needed, lack of food knowledge and preparation
 314 skills, lack of knowledge of meat substitutes, and lack of knowledge of seasonal foods

315

316 *Reflections - Week three*

317 Students' action-orientated reflection for week three focused on responding to the question -
 318 'based on what you have learnt and experienced this week what would be needed from the
 319 community, industry and/or government to support/enable the broader population to engage
 320 in your eco-friendly food challenge?' Students identified the importance of community
 321 members contributing to the demand side of system change, in particular, how consumers
 322 changing purchasing practices could influence the food system to drive positive change. They
 323 also suggested community driven initiatives and activities such as cooking classes and
 324 community gardening could assist engagement at a community level (Table 5).

325

326 Suggested government interventions focused around legislative and policy change, in
 327 addition to financial support for research and food system reorientation (Table 5). Students
 328 identified the role of both government and industry in developing education and awareness
 329 strategies that target a range of age groups and sectors. One student identified schools as a
 330 good setting for engaging younger people;

331 *'Other ways of engaging a population to committing to this eco-friendly challenge*
 332 *would be to target the younger population. School electives such as home economics*
 333 *and hospitality should be encouraged to incorporate a learning module into their*
 334 *learning criteria that covered the environmental impacts of the production of different*
 335 *foods'. [Student 2559_7_3]*

336 Industry initiatives, suggested by students, encompassed technological innovations (e.g.
 337 development of new meat alternatives), incentives for positive behaviours, changes to default

338 food service practices (e.g. reducing standard meat portion sizes) as well as industry led
339 practice changes to reflect both ethical and sustainable approaches.

340

341 Table 5. Suggestions provided in response to the action orientated reflective question in week
342 3 as to how the community or government could support or enable a broader population to
343 engage in the eco-friendly food challenge.

<p>Challenge 1 – Reduce food (and food related) waste</p> <p>Community...</p> <ul style="list-style-type: none"> • driven activities to engage people around reducing waste • members to drive demand for sustainable packaging and practices <p>Government...</p> <ul style="list-style-type: none"> • funded campaign to support reducing/repurposing of food waste • funded website on reducing food waste • funding for food preservation/waste reduction innovation in the food system • support for research • support for waste management/reduction strategies • supported initiatives to engage schools and workplaces in reducing food waste • laws to restrict use of plastic bags
<p>Challenge 2 – Localise food purchases</p> <p>Community...</p> <ul style="list-style-type: none"> • driven demand for local sustainably-produced foods • driven garden initiatives • based marketing of farmers markets and other local initiatives <p>Government...</p> <ul style="list-style-type: none"> • initiatives to support local food production and retail • transport initiatives to markets • forced transparency regarding origins of food
<p>Challenge 3 – Eat seasonably and sustainably</p> <p>Community...</p> <ul style="list-style-type: none"> • based workshops • financial support for seasonal and sustainably-produced produce • members to maintain gardens <p>Government...</p> <ul style="list-style-type: none"> • support to establish more farmers markets • based advertising to increase awareness of seasonal and sustainably-produced food retailers • funded campaign on the benefits of eating sustainably and in season • support of community gardens • School curriculum to cover learning about seasonal and sustainable produce
<p>Challenge 4 – Reduce meat consumption</p> <p>Community...</p>

- based activities about reducing meat consumption or increase vegetable consumption
- driven demand for industry transparency
- driven vegetarian enterprises and cooking classes
- driven demand for more vegetarian options among food retailers
- members to initiate awareness and generate change
- support for sustainably produced meat

Government...

- support for meatless Monday through advertising
- funded multi-media education on meat, health and sustainability
- increase the price of meat
- intervention to make sustainably produced meats more affordable
- policy and legislation to ensure sustainable and ethical practice
- support of meat free options in organisation-based food service

344

345 **Discussion**

346 This paper aimed to describe student reflections on their experiences, and self-reported
 347 learning from an experiential learning approach to engaging students in developing their
 348 understanding of sustainable food and dietary practices. The content of students' blogs was
 349 analysed to explore their perceived learnings and experiences. The results suggest that
 350 students engaged in a range of activities that align with more sustainable dietary practices.
 351 Their experiences and subsequent learnings reflect how engaging in practical activities
 352 fostered their knowledge and skills, and insight into issues relating to environmental
 353 sustainability and dietary practices. Reflections, scaffolded by action oriented questions,
 354 reveal students' exploration of barriers and multi-dimensional solutions for population level
 355 engagement in more sustainable practices.

356

357 The activities undertaken by students demonstrate the breadth of issues and practices students
 358 were exposed to both through their own experience as well as through reading and
 359 responding to each other blogs within their blogging community. Interestingly reducing waste
 360 (challenge one) and meat consumption (challenge four) were the most frequently chosen
 361 challenges to engage in. This contrasts to research undertaken in a range of populations,
 362 including university students, which has found most consumers resistant to reducing meat
 363 consumption as a climate change mitigation action compared with actions such as reducing
 364 food waste (Lea and Worsley, 2008, Campbell-Arvai, 2015, De Boer et al., 2016). Although
 365 this paper did not explore students' perception of the importance of each challenge, it is
 366 possible they perceived the potential nutritional benefits of reducing meat consumption which
 367 may reflect the current interests of the students in our sample. Alternatively, this may have

368 been a purely pragmatic decision to attempt an ‘easier/more straightforward’ challenge.
369 Challenge three - ‘eat seasonally and sustainably’ was relatively ambiguous and may explain
370 why changing food purchasing habits was the most common activity reported by students
371 undertaking both challenges two and three. This ambiguity may be a limitation of the eco-
372 friendly food challenge program, in particular challenge three, and should be modified if used
373 again.

374

375 Engaging students in reflection to facilitate learning from their experience/s is a key tenet of
376 experiential learning (Kolb and Kolb, 2005). Developing reflective practice, in conjunction
377 with experience has been shown to assist students to connect practice and reflection ‘in-situ’
378 (Epp, 2008). While it is an important skill, it is also recognised that it is a learned way of
379 being and reports suggest that difficulties are encountered in deepening the reflective
380 processes beyond pure descriptive reflection (O’connell and Dymont, 2011). In this study,
381 providing questions prompted student reflection, which is needed given the level of skill
382 present among students in their first year of tertiary education. Despite this, students’ self-
383 reported learning demonstrated an apparent increase in self-awareness, knowledge and skills
384 in problem solving. Student reflections on their own learning and suggested advice for others
385 focused on highly practical suggestions. This highlights the practical nature of many of the
386 changes required for consumers to adopt more sustainable practices. This task focused
387 students on thinking about challenges and overcoming these from a range of perspectives.
388 This way of thinking is needed in future practice by students from diverse disciplines,
389 including but not limited to those studying nutrition as current sustainability challenges are
390 significant. This learning approach may be used by other disciplines to help develop
391 sustainability focused graduates. Further development of authentic learning activities that
392 develop students’ skills in dealing with complex sustainability issues are needed to ensure
393 graduates are equipped to practice sustainability in the current and evolving context.

394

395 Barriers encountered by students as discussed in week two reflect a number of generic
396 personal and social challenges people often encounter when trying to change behaviour
397 (Vanstone et al., 2013) and have been found when exploring perceived and real barriers to
398 climate friendly food choices (Mäkinemi and Vainio, 2014). Developing this insight through
399 reflecting on personal experience and developing solutions may be important to assist
400 students to better understand food consumption, enabling and unsupportive factors, as well as
401 the broader determinants of sustainable food practices. The question posed in week two

402 focused on barriers specific to students, a population group previously identified as being at
403 higher risk of food insecurity (Hughes et al., 2011) and who may be described as a vulnerable
404 group. Students were able to identify challenges as well as solutions specific to this at-risk
405 group. This is important given that it is suggested that climate change and the effects on the
406 food system are likely to affect vulnerable groups in more significant ways, primarily related
407 to the anticipated rise in cost of food, and healthy food in particular (Edwards et al., 2011).

408

409 Student action-oriented reflections on community, industry and government level initiatives
410 to facilitate change reflect a diverse range of opportunities for involvement from these sectors.
411 This was important for students to consider as it has been previously identified that consumer
412 capacity is limited to respond to environmental sustainability issues without government and
413 industry support (Edwards et al., 2011). Nutrition science professionals need to engage in
414 systems thinking (analyse a sustainability problem from a holistic perspective or across
415 different domains and scales) to adequately understand and ultimately act effectively (Rayner
416 and Lang, 2012b, Wilkins et al., 2010). The questions posed attempted to extend students, to
417 situate consumer actions within the broader political and social context, developing their
418 understanding of the multiple determinants of food consumption and food systems.
419 Reflections, whilst diverse, suggest that students developed awareness of system related
420 factors that could facilitate population engagement with sustainability.

421

422 The approach used here to introduce concepts of sustainable dietary practices facilitated
423 students to direct their own learning and pursue learning in an area of interest and personal
424 choice. This approach is consistent with key concepts within the theory of adult learning
425 (andragogy) (Merriam, 2001). In addition, the work undertaken by students indicates that the
426 assessment built in the ability for students to pitch their learning at a level appropriate to their
427 learning context and what they perceived they already knew/didn't know about the topic. It
428 would also be of interest to investigate the effect of peer support and interaction on learning
429 in this type of approach. This task, although pitched at an introductory level, provides a basis
430 from which to further develop environmental sustainability-sensitive curriculum. The
431 capacity of the Australian nutrition workforce needs addressing in order for public health
432 nutrition to make a significant contribution to environmentally sustainable and secure food
433 systems. At present competencies in Australia for dietitians (Dietitians Association of
434 Australia) as well as aspirational competencies for public health nutrition (Hughes et al.,
435 2013) lack scope to adequately provide direction for educators and are not explicit about the

436 centrality of sustainable food systems to practice. Further work is needed to tease out
437 competency requirements at both undergraduate and postgraduate level nutrition education
438 around the issues of sustainability that extend beyond knowledge to encompass required
439 skills and values.

440

441 **Conclusion**

442 This assessment piece appeared to facilitate student understanding of environmental issues,
443 the challenges of changing behaviours and the structural and social challenges encountered
444 that need addressing for implementation of adaptation and mitigation strategies relating to
445 environmental sustainability. This approach presents a possible means for engaging students
446 across disciplines in the early stages of their studies introducing environmental sustainability
447 as an important lens through which to view their discipline knowledge and practice such as
448 food and nutrition for nutrition students.

449

450 Given the concern regarding the intersection of sustainability and nutritional health
451 (Burlingame, 2014), raised also by students in our work, future research could look at the
452 actual dietary impact of engagement in this type of challenge. Recent research suggests that it
453 is theoretically possible for a sustainable diet to meet dietary requirements (Macdiarmid et al.,
454 2012, Temme et al., 2013) however further research is needed to explore the actual impact of
455 dietary change when lay persons adopt sustainable dietary practices including those
456 suggested in the eco-food friendly challenge. In addition, further work is needed to build
457 curriculum approaches that facilitate nutrition students' engagement with the political and
458 social drivers of food and nutrition issues and develop needed skills for the future.

459

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463

464

465 **References**

466

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