Evaluation of the Outreach School Garden Project: Building the capacity of two Indigenous remote school communities to integrate nutrition into the core school curriculum

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Introduction
The original idea for the Outreach School Garden Project (OSGP) was a very simple and innovative approach to teach nutrition based on how the researcher learnt about nutrition as a child, through the family garden and home cooking. This research built on this concept and incorporated formal nutrition and gardening education lessons into the core school curriculum through key learning areas (KLAs), such as mathematics, English, health and physical activity, science and the arts. This practical and innovative school initiative was based on the Health Promoting Schools (HPS) Framework using processes of action research, social capital and experiential learning to build the capacity of Indigenous Australian school students in nutrition.

The project was conducted over a six-month period in two rural and remote Indigenous Australian school communities, Doomadgee (community 1) and Dajarra (community 2) in north-west Queensland. Doomadgee is a Deed of Grant Trust with a predominantly transient Indigenous population of 1,200, situated in the remote far north west of Queensland in the Gulf of Carpentaria. Dajarra has a population of 200 in a smaller, isolated and predominantly Indigenous township near Queensland’s border with the Northern Territory.

This evaluation examines how effective school gardens are as a nutritional education tool in Indigenous Australian school settings; monitors the extent that nutrition was integrated into the curriculum through the KLAs; investigates the knowledge, skills and attitudes of the students; monitors changes in the physical and organisational environment; and examines the development of partnerships and the sustainability of the project.

Abstract

Issue addressed: This paper describes the Outreach School Garden Project, which was conducted in two remote Indigenous school communities in north-west Queensland. This project integrated nutrition into the key learning areas of the core school curriculum by using a school-based garden as a nutritional education tool.

Methods: Evaluation was by a descriptive qualitative approach supplemented by some quantitative data consistent with Indigenous research methods. The objectives were linked to the Health Promoting Schools Framework, using concepts of community capacity building, action research, social capital and experiential learning.

Results: Nutrition was extensively integrated into the core school curriculum by the teaching staff, who required no specific nutrition knowledge or gardening skills prior to the implementation. Students’ knowledge and skills in nutrition and gardening were increased over the six-month period and positive improvements in the physical and social environment at the school were observed.

Conclusion: A school-based nutrition garden enables the teaching and learning of basic nutrition through the core school curriculum. This concept was an innovative, practical nutritional education tool to engage and build the capacity of Indigenous students, school staff and the broader community in nutrition.

Key words: Indigenous, nutrition, schools, gardens, school curriculum, capacity building, innovative.

So what?
This method provided a stimulating and creative way to focus on nutrition in the school environment, positively influencing the students’ knowledge of nutrition and future health practices. This concept is not limited to Indigenous students and can be used in all school environments.
Background
Indigenous Australians experience considerable disadvantages in terms of their health and socio-economic status, and have higher levels of morbidity and mortality than non-Indigenous Australians. There are complex reasons for this inequality: European colonisation, lifestyle changes, physical activity and nutrition are significant factors. However, much of the ill-health of Indigenous Australians can be attributed to nutrition-related chronic diseases such as obesity, diabetes, cardiovascular disease and cancer, many of which are thought to begin in early childhood.

Nutrition and Indigenous children
On average, most children in Australia eat less than the recommended amounts of vegetables and fruit. Indigenous children reportedly consume less fruit, vegetables and dairy items than non-Indigenous children and thus have a poorer health status. In rural and remote Australia this is more pronounced, because access to and availability of fruit and vegetables are highly influenced by the frequency, cost and methods of transport, seasonal factors, and community store management practices. Therefore, there is a need to focus nutrition interventions in schools on improving children’s awareness and behaviour concerning nutrition and health.

Schools, health promotion and capacity building
The World Health Organization’s HPS Framework is the basis of recommended health promotion practice in schools. Although not developed specifically for Indigenous communities, this framework provided an integrated and holistic structure for working within this area. The approach linked the curriculum with the school environment and community. It has been documented to improve a school’s physical and social environment; curriculum, teaching and learning methods; and the personal and social development of students. This framework enabled the creation of a capacity-building environment to improve both the education and health outcomes of students in participating schools.

Capacity building is a dynamic process linked to the principles of social capital. Social capital involves developing high levels of co-operation, trust, mutual understanding, and shared values and behaviours to bind and connect community members, making co-operative action possible. This complements the HPS Framework, which is also similar to action research — a guided, reflective process constituting a cycle of planning, acting, observing and reflecting. This is an appropriate approach for use in Indigenous communities. Using capacity building, coupled with an action research approach, has been demonstrated to enhance knowledge, skills, resources and management support for school health promotion.

Schools and nutrition interventions
The benefit of working with schools to promote health has been well documented as improving the knowledge and attitudes of students, staff and parents towards fruit and vegetables. Even so, there are also practical challenges and limitations such as time constraints, overcrowded curriculum, teacher skills, and availability of funding or organisational issues. These lead to many school health promotion programs being unpublished. Therefore, health promotion programs and strategies need to be tailored to meet the specific school population; developed in partnership; adequately resourced; and planned and supported within a restricted but adequate timeframe to have an impact. St Legers also recommends that non-classroom-based initiatives are developed between the health and education sectors to assist this process.

Nutrition and school gardens
School gardens are a non-classroom-based initiative and a key source of experiential learning. They have been used to teach core academic subjects such as science, language, arts, maths and even nutrition by incorporating a hands-on learning environment. School gardens have been documented to have a positive impact on children’s food choices by improving preferences for fruit and vegetables, increasing nutrition knowledge and fruit and vegetable consumption. School gardens are a flexible teaching tool that can be shaped by the style and goals of individual teachers. Teachers are not required to have knowledge of, or experience in, gardening as this can be acquired. Realistically, integrating school gardens into the school curriculum also requires time, energy, funding and effort. It also requires student and staff support, especially from the school principal. However, information on the use of school gardens in Indigenous school environments has not been published.

Methodology
At the time of the study, the researcher had been working in both communities for more than three years as the outreach community dietitian. Consent for this project was provided as an extension of the researcher’s work.

Ethics approval
The sensitivity of working with Indigenous communities and directly with children necessitates appropriate evaluation methodology. Both communities were consulted at each stage of the research and actively participated in all decision-making processes. Written school and community approval was obtained from the principals and community advisory groups, respectively. Ethical approval was granted by two ethics committees: the Behavioural and Social Sciences Ethical Review Committee at the University of Queensland and the Mount Isa Health Service District Research and Ethics Advisory Committee.

Facilitation process
The researcher lived in Mount Isa, some distance from each community, and conducted outreach visits for 3-5 days every
6-8 weeks. Each school principal appointed a co-ordinator for the project to assist facilitation at the local level. Regular teleconference and phone debriefings supplemented outreach visits to keep the researcher informed of the progress and significant project events.

Participants
School students in the secondary levels from Years 7, 8 and 9 in community 1 and students in the primary levels 4, 5 and 6 in community 2 participated in the project, the participating grades being determined by the principal in each school. Key informants were selected from each community advisory group to participate in the semi-structured interviews. Formal written consent was obtained prior to the interview. Nine people from community 1 and six people from community 2 participated.

Data collection and analysis
A descriptive qualitative approach supplemented by some quantitative data was used for evaluation of the project over a six-month period. This timeframe was designed to capture the larger context of the program development and implementation. This approach was well suited to the evaluation of what was an innovative program that was likely to change over time. The objectives were based on the HPS Framework and were evaluated via data collection instruments, particularly activity sheets (‘My Healthy Dinner Plate Activity’ and ‘The Pyramid Activity’), a curriculum matrix, semi-structured interviews, reflective journal and an event log.

Data collection instruments were piloted prior to the implementation and developed to assess knowledge and attitude changes. Activity sheets used to collect data on nutritional knowledge were chosen to meet the needs of students with potentially poor literacy and numeracy skills. The ‘My Healthy Dinner Plate Activity’ asked students to draw what they believed a healthy meal would consist of on an imaginary plate, while ‘The Pyramid Activity’ asked students to indicate the category a particular food item belonged to on the Healthy Food Pyramid. The data were analysed by tallying food items and collating the percentages of correct answers, respectively. The activity sheets had a visual focus, with participants presenting their understanding of nutritional issues through drawings.

The curriculum matrix was used to enter KLA data that addressed nutrition. The researcher used a reflective journal and event logs to register all school garden nutrition-related activities. Rigour and reliability of the data and results were enhanced by using a triangulation of research methods and data sources. By using multiple forms of evidence and perspectives, a truer evaluation and portrait of the project was developed.

Results and Discussion
Communities are both complex and dynamic. Indigenous communities and schools located within them provide a challenging context for any health-related interventions. The evaluation of an intervention within the context of two rural and remote Indigenous Australian communities required both creativity and innovation. As many researchers have found, conventional approaches to working with communities and undertaking health-related projects do not commonly work well in Indigenous communities. Therefore, a capacity-building approach that used action research principles provided an alternative to the rigidity of a more conventional evaluation approach. This approach also proved sufficiently flexible for the project to change and adapt as learning by staff, students and the researcher progressed. The HPS Framework provided a vision and direction for action and was familiar and acceptable to both the school principals and the Indigenous school community.

Working from an established position within the school and broader community to change existing practices in both schools broke with the more conventional role of researcher and evaluator. Creating social capital, by forming relationships with students and teachers and maintaining a personal connection with the communities, the researcher moved away from the more conventional role to a more effective role of collaborator and facilitator. This personable approach built credibility and assisted in negotiating and mobilising change, especially when introducing and facilitating a new intervention. This was particularly important because this approach had never been used before in either school community.

<table>
<thead>
<tr>
<th>Community</th>
<th>School level and total number of students in all grades</th>
<th>Total number of students in the participating classes</th>
<th>Actual number of participating students</th>
<th>Overall participant rate</th>
<th>Distribution (female/male)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community 1</td>
<td>Primary and secondary school n=281</td>
<td>Secondary students (Years 7, 8, 9) n=66</td>
<td>n=15</td>
<td>23%</td>
<td>F=17 M=29</td>
</tr>
<tr>
<td>Community 2</td>
<td>Primary school n=43</td>
<td>Primary students (Years 4, 5, 6) n=20</td>
<td>n=20</td>
<td>100%</td>
<td>F=8 M=12</td>
</tr>
</tbody>
</table>

The approaches used here took account of learning techniques that tend to work well with Indigenous students and communities. That is, the gardens provided a concrete and tactile experiential learning experience that was shared with students, staff and the broader school community.

**Participation**

The principal’s approval and support for the project was the key to the success of staff, students and community participation. Student numbers participating in the OSGP are given in Table 1. The primary students (n=20) in community 2 were more willing to participate than secondary students (n=66) in community 1, with 100% (n=20) and 23% (n=15) of students participating, respectively. This is reflected in the literature, as school-based gardens are commonly undertaken with primary rather than secondary students. The core curriculum standards at primary level are perceived to be easier to meet using a school garden compared with the secondary level, plus all children at the primary level stay in the same classroom throughout the day. The low participation rate with the secondary students may also reflect the high drop-out rate of Indigenous secondary students, with only 66 secondary students in total in community 1.

**Local community dynamics**

Both communities are small, remote areas where local community issues always have an impact on the school environment. For example, deaths in the community, conflict, and community time all had an impact in several ways on the project, causing problems with meeting research and project deadlines and expectations.

**Curriculum, teaching and learning**

At the end of the six-month period, the OSGP became a major focus for teaching, to the extent that almost “every lesson was tied into the theme of the school garden and nutrition, [and] we found the process was part of our usual school day”. All that was required by the teachers was some imagination and a willingness to be creative. One teacher felt that “Teachers are only limited by their imagination”, but the success of such a project is “only as good as the teacher behind it”.

Table 2 outlines how nutrition was incorporated into the KLAs. There was considerable overlap between the primary and secondary school curriculum. The overall integration of nutrition into the curriculum was quite similar, the garden being used to assist students in mathematical calculations, measurements, space and numbers and problem solving. Maintaining a weekly diary on the project assisted with writing skills and students from both schools developed garden booklets and a garden-bingo game in English classes. For one teacher, the most important outcome for this project was that “the students are learning life skills through this project ... they have learnt so

| Table 2: Examples of how nutrition was integrated into the core curriculum through some of the key learning areas. |
|---|---|---|
| **Key learning areas** | **Strand** | **Examples of activities** |
| Language (English) | Reading and viewing | • Reading nutrition-themed books, e.g. *James and the Giant Peach*  
• Watching videos related to past gardens in the communities  
• Reading recipes  
• Gardening Bingo – student quiz on garden concepts | |
| Writing | • Weekly diary of the progress of the school garden  
• Writing a book on *How to make a Healthy Sandwich*  
• Writing to the local council about the environmental issues at the local park and weir.  
• Foyer display of school garden and environmental issues | |
| Mathematics | Money | • Purchasing healthy food from the store and using realistic money transactions | |
| Mass | • Conversions between g/kg using the produce of the garden | |
| Measurements | • Using the garden to address mathematical calculations of area, volume and lengths and graphing these measurements | |
| Statistics | • The school garden was used to collect, survey, organise and record data of the growth of the plants using tally marks; tables and bar graphs were then generated by each student | |
| Health and physical education (HPE) | Promoting health of individuals | • Through school lesson activities the students described the impact of their own and others’ behaviour on health, and proposed personal and group actions to promote health, using a self-assessment sheet formulated by the teacher  
• Students explained how eating behaviours affected health, working with the researcher in a HPE class lesson | |
| Nutrition | • Introduction to the Healthy Food Pyramid and discussing availability at their local community store | |
| Science and technology | Life and living | • Environmental issues – students addressed ways to clean up the community by sending a collectively written letter to the local Indigenous Council  
• School lesson activities examined food throughout the food cycle, through activity sheets | |
| Art and design | Drama | • Participation in rehearsed group presentations about the school garden project for the staff and community members | |
| Music | • Participation in action songs related to nutrition and the school garden (e.g. ‘Going down the food tube’; ‘Message from the Chief Food Detective’) | |
| Visual arts | • Drawing an interpretation of a ‘healthy plate’  
• Drawing a graphic outline of their own interpretation of the school garden | |
much about nutrition … how it affects the body, the cycle of food, about waste management … all this has been incorporated in the curriculum”.

**Nutrition knowledge and environment**

Table 3 outlines the results for the ‘My Healthy Dinner Plate Activity’ and shows that high fat and refined carbohydrate convenience food items were commonly selected as healthy food choices in the pre-implementation phase, whereas at the assessment after six months no convenience food items were drawn at all. Fruit and vegetables and some bush food items were more frequently illustrated.

There was very little difference in the food choices between communities at either pre or post implementation. One teacher was “… amazed about what they drew the second time, it was just so different … they put down more healthy food choices and bush foods as well”. The cultural connection also was evident, with many of the students identifying bush foods as “healthy”.

The primary students in community 2 increased their knowledge in nearly all items in Table 4, from pre to post implementation. However, the secondary students in community 1 scored very poorly on nearly all items for this activity, even producing a lower score in the post test. This was caused by the participating students in the secondary school in community 1 being unruly and unresponsive compared with the enthusiastic primary school participants when completing the post-implementation activity sheets.

**School organisation, ethos and environment**

The OSGP acted as a catalyst for action and change, especially as “working outside the classroom in a less structured and more practical environment was great for the kids, they loved it [school garden] because they were outside”.

In community 1, waste management was identified as an environmental issue, particularly school rubbish bins and community litter. Students explored ways of cleaning their school and environment. They began with a discussion about the rubbish problem and what action they could take. The students wrote to the local council requesting assistance with this environmental issue, recorded data on a chart with photos and displayed them in the school foyer.

In community 1 and 2, the tuckshops incorporated healthy food choices on their menus; for example, spaghetti bolognaise, hamburgers, stew and rice, plus a drink of milk, fruit juice or water. This was especially significant, as non-nutritious items such as softdrink, chips, pies and other convenience food items previously predominated. Cooked meals were provided to the students at $1 a day with financial support from the Aboriginal Student Support and Parental Awareness (ASSPA) and the school budget. As a result, the school timetable also changed so that school students started school earlier, remained at school after lunch and were provided with a nutritious meal.

In support of this change, students had the opportunity to participate in food preparation for the tuckshop. This involved a rotation of students in community 2 assisting the tuckshop ladies (teacher-aides) to prepare “big lunch” for other students in the school (approx 40-50 students). One student said that “Doin’ the cook-up with Miss … was fun. We put a recipe book together for the tuckshop as well. We did this every week so that the tuckshop would have healthy food”.

In community 1, the tuckshop also provided a teaching setting,

<table>
<thead>
<tr>
<th>Core food groups</th>
<th><strong>Community 1</strong></th>
<th><strong>Community 2</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre</strong></td>
<td><strong>Post</strong></td>
<td><strong>Pre</strong></td>
</tr>
<tr>
<td>Bread, cereals, rice, pasta, noodles</td>
<td>Rice</td>
<td>Bread, rice</td>
</tr>
<tr>
<td>Fruit</td>
<td>Mandarin, pear orange, banana apple, berries</td>
<td>Cherry, watermelon, peach, apple, coconut, banana, pineapple, apricot, mango, orange</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Carrot, capsicum, tomato, cabbage</td>
<td>Tomato, carrot, potato, pea, corn, celery, broccoli, marrow, capsicum, pumpkin, onion</td>
</tr>
<tr>
<td>Meat and alternatives (e.g. poultry, fish, eggs, nuts, legumes)</td>
<td>Oxtail, fish, chicken</td>
<td>Fresh meat from shop, beef, guinea, turtle, eggs, chicken, fish, stew, organ meat, snake</td>
</tr>
<tr>
<td>Milk, cheese, yoghurt or milk equivalent</td>
<td>Milk</td>
<td>Milk, yoghurt, cheese</td>
</tr>
<tr>
<td>Miscellaneous: fast food and convenience food items etc</td>
<td>Pie, softdrink, fish &amp; chips, chicken &amp; chips, pizza</td>
<td></td>
</tr>
</tbody>
</table>
where students compiled a recipe book of healthy-choice meals to be used by the tuckshop called How to make a Healthy Sandwich, which was used in a peer teaching lesson with the Year 2/3 class.

Partnerships and services
An inventive 'Action-Kids' group was formed in community 2, which also created an Action Kids song for the primary group. "We are action kids, We are healthy kids, We love gardening the best, We are the best in the west". This demonstrated ownership of the project in the initial stages.

The students in community 1 created an 'Adopt-a-Garden' concept. This involved establishing links with elders or community members who had an existing garden or who wanted to start a garden. The idea behind this was to access and use existing resources in the community and provide links to their historical roots. The elders would tell stories of the mission gardens: "When I was a little girl at a school I had jobs to do after school. Weedin' in the garden, pickin' vegetables and packin' them on to the trailer. That was our little school chore in the afternoon. Helping the gardener to do a bit of gardening".

Capacity building and sustainability
Capacity building provided an important theoretical framework underpinning the OSGP, enabling school communities to identify concerns and problem solve solutions appropriate to their own health and nutrition needs.36

The project in both schools did not continue after the six-month timeframe because the researcher left her post as outreach community dietitian. Despite this, the sustainable skills of the students and teaching staff extended to the knowledge and skills gained from the student activity sheets; the intense level of integration of nutrition into the school curriculum; and the acquisition of practical skills required for the preparation of healthy and nutritious meals. Although the project was effective in the short term, further work needed to be done with respect to sustainability.

Barriers to sustainability
Several barriers to sustainability have been identified (see Table 5). A further limitation was the fact that the researcher was both the facilitator and the evaluator of the project, which is not the most beneficial or unbiased assessment. However, the fact that the projects were implemented and sustained for more than six months in each community, with the researcher some considerable distance from each site, suggests that this approach to improving the health and nutrition skills, knowledge and attitudes of Indigenous children has merit.

Conclusion
The sustainability of such an innovative project working with Indigenous students in rural and remote Australia required a variety of skills and awareness of unforeseen community issues, which ultimately affected the project’s sustainability. However, the capacity-building effect of the project was evidenced by the impact and effect of a simple school garden concept that snowballed and developed into a clear nutritional education tool. All KLAS in the curriculum focused on nutrition and enhanced the emphasis on nutrition beyond the garden. This resulted in the whole school community being enthusiastic about the project and adopting a nutrition focus. Implementation of this concept was also more effective in the primary than secondary school setting, with enthusiasm and motivation being more easily stimulated in younger children and the primary school curriculum and classroom dynamics more adaptable to capacity-building activities.

Capacity building in Indigenous communities is a dynamic process and involves awareness of multiple factors, social levels, cultural and ethical issues and needs to be tailored to the context of each individual Indigenous school community. It must be acknowledged that Indigenous people already participate in their own cultural systems, institutions and structures. As a

<p>| Table 4: Percentages of correct answers to The Pyramid Activity obtained in both communities. |</p>
<table>
<thead>
<tr>
<th>Food item</th>
<th>Community 1 Pre (%)</th>
<th>Community 1 Post (%)</th>
<th>Community 2 Pre (%)</th>
<th>Community 2 Post (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheese</td>
<td>75</td>
<td>62</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Carrot</td>
<td>92</td>
<td>57</td>
<td>52</td>
<td>75</td>
</tr>
<tr>
<td>Fish</td>
<td>67</td>
<td>52</td>
<td>24</td>
<td>35</td>
</tr>
<tr>
<td>Cake</td>
<td>92</td>
<td>76</td>
<td>62</td>
<td>85</td>
</tr>
<tr>
<td>Pear</td>
<td>84</td>
<td>52</td>
<td>72</td>
<td>85</td>
</tr>
<tr>
<td>Softdrink</td>
<td>84</td>
<td>65</td>
<td>67</td>
<td>72</td>
</tr>
<tr>
<td>Milk</td>
<td>50</td>
<td>28</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Lollies</td>
<td>100</td>
<td>70</td>
<td>76</td>
<td>90</td>
</tr>
<tr>
<td>Egg</td>
<td>92</td>
<td>57</td>
<td>24</td>
<td>60</td>
</tr>
<tr>
<td>Bananas</td>
<td>84</td>
<td>85</td>
<td>72</td>
<td>90</td>
</tr>
<tr>
<td>Butter</td>
<td>92</td>
<td>76</td>
<td>52</td>
<td>60</td>
</tr>
<tr>
<td>Bread</td>
<td>67</td>
<td>66</td>
<td>82</td>
<td>90</td>
</tr>
<tr>
<td>Nuts</td>
<td>42</td>
<td>38</td>
<td>33</td>
<td>25</td>
</tr>
<tr>
<td>Pineapple</td>
<td>84</td>
<td>66</td>
<td>72</td>
<td>80</td>
</tr>
</tbody>
</table>

| Table 5: A list of barriers to sustainability. |
| List of items |
| Researcher did not reside in each community and had to liaise via distance or on her outreach visits to each community within the project. |
| Researcher not being able to continue facilitating the project beyond the six-month period. |
| Progress was not always as productive as anticipated due to factors such as the high degree of absenteeism in school children. |
| Changes and unforeseen teaching staff turnover. |
| Community transience. |
| Both school communities being in remote rural areas. |
| The limited and short six-month time frame for the evaluation process. |
facilitator and researcher of a community capacity-building project, the author recommends that this needs to be harnessed, captured and directed towards nutritional capacity-building initiatives.

Acknowledgements

The author wishes to acknowledge the contributions of the project participants, including the communities of Doomadgee and Dajarra in Queensland. This project was the 2001 National and State category winner of the National Heart Foundation Local Government Kelloggs Award for ‘Project with limited funding’. This provided a $1,000 cheque to each school and a plaque.

References


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