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Learning Preferences and Impacts of Education Programs in Dog Health Programs in Five Rural and Remote Australian Indigenous Communities

Sophie Constable,[1] Roselyn Dixon,[2] and Robert Dixon
[1] *Animal Management in Rural and Remote Indigenous Communities, Northern Territory, Australia*
[2] *Faculty of Education, University of Wollongong, New South Wales, Australia*

As part of strategies to improve dog and community health in rural and remote Indigenous communities, this study investigated preferences and impacts of dog health education programs. Semistructured interviews with 63 residents from five communities explored learning preferences. Though each community differed, on average yarning was preferred by most (68.4%) respondents, followed by visual (65.0%) and practical learning (46.9%). Text-based and computer/screen-based learning were important to 16.2% and 14.6% of respondents respectively. With paper-based visual and text resources, respondents reported a preference for locally made (28/36 or 78%) over mainstream resources. Twenty eight residents involved in the creation of locally made resources reported satisfaction, knowledge exchange, and displayed enthusiasm for the process. Colour resources were more successful than black and white resources or word of mouth in terms of program advertising, alerting 67% (10/15) of respondents compared to 6% to 24% for programs using word of mouth. Dog health programs that incorporated education programs based on these identified preferences achieved significantly better results in terms of improvements in mange prevalence and average condition score, partly through increased community understanding and engagement with the program. Thus, culturally appropriate and locally relevant education programs can significantly improve the success of dog health programs.

■ **Keywords:** Aboriginal education, dog health, community development, community health promotion, Indigenous health

Since colonisation, the health environment in Australia has undergone rapid change; health issues are now a product of the interaction between Indigenous and introduced pathogens, living styles and treatments. Although traditionally in Indigenous communities, sources of information were available that advised on health matters, such as knowing what medicines should be harvested and how they should be prepared and administered, and what ceremonies ought to be conducted (Trudgen, 2003), the sharing of knowledge about these issues has not kept pace with the rate of change in living conditions, particularly in remote communities (Donohue, Garrawurri, & Trudgen, 2000). Similar to the situation with human health, the health of dogs in rural and remote Indigenous communities is in many areas worse than suburban averages (Constable, Brown, Dixon, & Dixon, 2008; Palmer & Presson, 1990). This is important not only in terms of dog welfare but because it impacts on human health, physically, mentally, and spiritually. Dogs contribute to unsanitary living conditions through faecal contamination and spreading rubbish (Nganampa Health Council, 1987). Further, dogs and people in remote Indigenous communities have been found to share specific pathogens such as *Salmonella* spp. (Brown, 2006), as well as impacting through transient

ADDRESS FOR CORRESPONDENCE: Sophie Constable, Animal Management in Rural and Remote Indigenous Communities, PO Box 1464, Nightcliff, Darwin, Northern Territory, 0814, Australia. E-mail: sophiec@amrric.org

scabies and skin sores (Speare, 2006), and new zoonotic risks are still being discovered (Brown et al., 2006; Hii et al., in press). Also, as dogs can have important roles in many Indigenous cultures including spiritual guarding and companionship, their health and wellbeing impacts on community pride or conversely, worry and shame, and thus mental and spiritual health (Allen, 2011).

However, few studies have explored how to improve this situation, and none have seriously addressed the importance of education. MacLennan and Khavarpour (2004) note 'there is increasing recognition of the need for greater understanding of Indigenous health needs and means by which to deal with them' (p. 237). This is equally applicable to dog health as it is to human health.

In the human health field, miscommunication between health professionals and Indigenous clients is considered to be widespread (Cass et al., 2002; Eley & Hunter, 2006). This is likely to be the case in the veterinary sphere as well, and anecdotal reports emphasise this. Hunter (2004) found despite increased efforts to improve communication between Indigenous clients and health workers in the human health field, miscommunication is still common and results in negative effects for patients and carers. Eley and Hunter (2006) called for research into ways to improve communication between health workers and patients. In the veterinary field, this work has barely commenced. While Howe (1993) and Senior, Chenhall, McRae-Williams, Daniels, and Rogers (2006) investigated the human–animal bond between Indigenous peoples and their dogs, neither focused on ascertaining which content and formats would be of most community interest in dog health education campaigns, leaving this area unresearched.

Professionals communicate with each other in set languages and modes, such as academic journals and conferences. Communicating outside this paradigm, such as with schools or community groups, is not a skill often targeted in university curricula, or prioritised by students (Gray, Emerson, & MacKay, 2006) and sometimes does not come naturally to professionals . Without practice and experience, professionals may feel at a loss of how to proceed when faced with communicating with non-professional people. When this communication also needs to bridge cross-cultural divides, this sense of uncertainty may be heightened.

However, many instances of well-meaning outsiders trying to apply their methods of knowledge sharing to another learning community have proved less than successful. In the past, techniques based in Euro-Australian cultural tradition were used in Indigenous education, to little success (Keeffe, 1992). From previous health education programs, Leggatt (2002) states that 'past experience has taught that bureaucratic "whitefella" education initiatives do not work; initiatives must be a realisation of the goals of the community' (p. 60).

Further, Trudgen (2003) proposed that imposing western culture can be detrimental to the community. Imposition of western culture can challenge the cultural life of the community, creating conflict and weakening the community's independance and self-determination, their ability to take their destiny into their own hands, a view also supported by Wilkinson and Sidel (1991). Extra-community initiatives were found to reinforce stereotypes, and to reinforce the sense of victimhood, shame and apathy (Pyett, Waples-Crowe, & van der Sterren, 2008), which is detrimental to the long-term health of community.

To avoid this health education should instead aim to work within community needs, beliefs, and expectations, rather than impose their own belief systems (Eckermann et al., 1998; Golds, King, Meiklejohn, Campion, & Wise, 1997; Heil, 2008; Pauwells, 1995). In order to do this, health education should address local appropriateness and relevance at the levels of topic, format, and underlying values.

Topics

Western educational research finds that there are prerequisites for learning in any culture, including Indigenous cultures (Gray, 1990). These include that the topic the learning addresses is of relevance and interest to the learner (Abrami & Chambers, 1996). If the topic is relevant, the learner is much more likely to be interested and receptive to the learning situation. To ascertain the topics of relevance in any given community, it is important to conduct a needs analysis for each community, so that the learning will be tailored to locally relevant topics rather than those which outsiders may assume are most important

Format

Professional Euro-Australian communication culture, especially in the sciences, emphasises writing and talking, with most communication occurring through journals and conferences (Gray et al., 2006). This type of communication relies on good literacy and English language familiarity. However, previous studies have found that learning through observation, practice, and using visual and in-language resources to be preferred in many cross-cultural contexts (Dixon, Dixon, & Constable, 2007; Gray, 1990; Hughes, More, & Williams, 2004).

How this translates effectively into physical learning resources is still being investigated. O'Connor, Parker, Mieklejohn, Oldenburg, & Alati (1999) sent Healthy Heart resources to be evaluated by doctors and Indigenous health workers. They found that the Indigenous health workers prioritised resources in appropriate formats (e.g., simple design, large print, appropriate reading age level, colourful, culturally appropriate, locally relevant images and language) over those chosen by other health professionals for the quality of their content. However, they did not test these resources on community members at large.

Brady and MacKenzie-Taylor (2002) went further in their investigation of their single resource, *The Grog Book*. They interviewed Indigenous respondents in urban, rural and remote communities on the appropriateness of the resource. Their findings stressed the importance of images, depictions of people the viewer could identify with, full colour over two colour, short paragraphs rather than blocks of text, and the importance of relevant and communicative languages like Aboriginal English. However, as they focused on a single resource, respondents did not have the choice of alternate formats.

While O'Connor et al. (1999) and Brady and MacKenzie-Taylor (2002) researched preferred learning formats in the human health field, no study has examined this in the veterinary field. Further, no study has examined these areas with a range of resources across both a wide geographical range as well as with both community members and health workers. Lastly, no study has examined the impact of veterinary education programs on health.

Underlying Values

In communication between veterinary and Indigenous community spheres of knowledge, a double cultural shift is crossed. There are both the western–Indigenous and expert-layperson fronts to consider. Poroch (2006) found that the differences in each group's world views created equivalent but differing knowledge constructs, that if not acknowledged and respected could cause communication breakdown. These include differing views on health as well as social responsibilities and priorities. For example, the National Aboriginal Health Strategy Working Party defines health as 'not just the physical well-being of the individual, but the social, emotional, and cultural well-being of the whole community' (Australian Government, 1989). This view has been supported by many independent Indigenous voices (Anderson, 1999; Golds et al., 1997; Heil, 2008). In particular, the deficiency of mainstream health education programs to address important spiritual aspects has been noted by MacLennan and Khavarpour (2004); Jamieson, Parker, and Richards (2008); and Constable, Dixon, and Dixon (2010). This research study aimed to address the gaps in the literature identified above. It assessed the preferences for learning styles and formats, as well as local or extra-community made veterinary health resources in Indigenous community members and health workers across a range of rural and remote communities. The qualitative results of the study were further cross-validated with quantitative data on dog health.

Background to This Study

In order to further knowledge about dog health in Indigenous communities and approaches to improving and sustaining it, the Healthy Dogs Healthy Communities (HDHC) program was created, funded by an ARC Linkage grant (see Acknowledgements) and coordinated through the University of Sydney. In 2006 to 2008 HDHC initially undertook needs analysis and dog health surveys in six Indigenous communities. The findings showed many, but not all, health and wellbeing indicators to be poorer in rural and remote Indigenous communities. A lack of knowledge sharing, and a lack of engagement between service providers, organisers, and the community, as well as a lack of access to veterinary services were found to be major factors in dog health issues (Constable et al., 2008).

To address this identified lack of knowledge sharing, a pilot project was conducted in one community to trial knowledge sharing techniques (Dixon et al., 2007). This found success with generative curriculum workshopping models, in which Indigenous knowledge is brought into the process of teaching and learning by community members and is integrated with an empirical knowledge base. Locally relevant content, appropriate learning processes, and supporting different world views was also found to be important, and further involvement of community members recommended.

Using the results of that study, local teams were formulated to work on education issues in five other communities. These teams consisted of at least one veterinarian with tertiary qualifications in Indigenous education, and three to seven interested Indigenous community members. Indigenous team members sometimes had previous training in environmental and companion animal health, and others did not. All were versed in the previous findings of the study, especially in terms of community concerns and dog health issues, in order to have a shared pool of information to work from. The team then discussed and acted upon the best ways to share this information with the rest of the community, which included the production of several resources (Constable, Dixon, & Dixon, 2011a). The resultant resources were analysed and compared with resources available from the local or servicing veterinary clinic (Constable, Dixon, & Dixon, 2011b). This article reports on the results of interviews with community members regarding their preferences in terms of learning and resources, and the effect of these resources in dog health education initiatives as part of larger dog health service delivery programs.

Communities

Five communities were enrolled in this study as part of a larger study (Constable et al., 2008). Further, the semi-structured interviews were repeated across five different rural and remote Indigenous communities, to strengthen the validity of the results. They were chosen to explore a range of socioenvironmental situations, and so involved four Australian states and territories (New South Wales [NSW], Northern Territory [NT], Queensland [Qld],

TABLE 1

Remoteness Scores and Environmental Location of the Five Study Communities

Communities	Location	ARIA score	Remoteness category
NSW	Inland	7.23	Remote
Qld	Coastal	4.19	Moderately accessible
NT1	Inland	9.75	Remote
NT2	Coastal	11.02	Very remote
WA	Coastal	11	Very remote

Note: Accessibility and Remoteness Index of Australia (ARIA) scores are calculated by the Australian Bureau of Statistics based on current census data (2006). ARIA values give a numerical value for a geographic area to quantify its 'remoteness', that is, lack of accessibility to services regarded as normal in metropolitan areas. The score is calculated from accessibility to some 201 service centres based on road distances, with an additional remoteness factor for islands (Department of Health 2001). Socioeconomic, urban/rural and population size factors are not factored into the ARIA score.

Western Australia [WA]). Members of at least eleven different Indigenous cultures were thus included (Anmatjerre, Warlpiri, Tiwi, Nyul Nyul, Mangala, Karajarri, Nyangumarta, Juwalin, Torres Strait Islander, Gamilaraay, and Gunggay peoples).

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Participants

A total of 63 respondents over five communities, including 23 local dog health workers, were interviewed. Respondents were interviewed regarding preferred learning formats during dog health programs and resource creation workshops. Interviews on resource preference and the effect of advertising were conducted with consenting adults in the general community during dog health programs. The breakdown into male and female respondents is shown in Table 2. Overall, 34 males and 29 females participated in the interviews.

Interview Procedure

Semistructured interviews on learning preference were conducted with consenting adults during training workshops, resource creation workshops, and opportunistically. Interviews were transcribed and responses coded into preferences for yarning, visual, practical, text based or technological learning. If a person preferred two learning styles equally, both were marked down.

Explanation of terms

'Yarning' is used as opposed to the term 'verbal communication', because yarning implies an Indigenous cultural communication style, whereas verbal can also imply a less appropriate didactic format. Visual learning indicated learning using images. Practical learning indicated learning through practical involvement or observation of a practical demonstration. Text-based learning indicated learning through nondigitised text, such as books, and pamphlets. Technological learning included DVD and computer-based learning (e.g., PowerPoint).

Calculations

Total numbers of responses for each learning style were then summed and divided by the number of respondents for that community to calculate a community percentage preference. Community percent preferences were then averaged to form an average percent preference for each learning style.

Effect on Dog Health

In order to expand the database to ensure statistically relevant results, data was included from three further Indigenous communities as described in Constable, Brown, et al. (2011). This ensured there were adequate examples of dog health programs that did not use educational programs in the database, to ensure a valid comparison. In all, 19 community visits provided sufficient data for analysis.

In each community, as part of a house-to-house survey, dogs were visually assessed for signs of mange (hair loss, itchiness, skin thickening) by the same veterinarian. From this, the proportion of dogs showing mange-like signs (MaLiS) was calculated for each visit. These proportions were then compared to the prevalence of MaLiS before the program, to achieve a value for the percent reduction in mange. Likewise, condition score, measured on German et al.'s (2006) 9-point scale, was averaged for each community visit and compared to pre-program levels. Each visit

TABLE 2

Number of Male and Female Respondents by Community, Learning Preference Interviews

		Health Workers		Community residents	
Community	*n*	Male	Female	Male	Female
NSW	12	2	2	3	5
Qld	25	5	2	8	10
NT1	7	1	0	2	4
NT2	9	9	0	0	0
WA	10	2	1	2	5
Total	63	19	5	15	24

was then assigned to an analysis group according to the nature of the dog health program being undertaken, that is, their personnel composition (dog health worker [DHW] or veterinary [VET], or both [DHW+VET]), and whether they used educational programs (DHW+ED, VET+ED, or DHW+VET+ED). Regression analysis was then used to analyse the effect of the six different treatment factors (DHW, DHW+ED, VET, VET+ED, DHW+VET, DHW+VET+ED).

Statistical analysis

GenStat 12th edition's generalised linear mixed model restricted maximum likelihood (REML) was used to perform linear regression to assess treatment groupings as a predictor of prevalence of dogs with mange-like signs, compared to the measured baseline. Odds ratio and least significant differences were then calculated from the REML outputs. For all analysis, the significance level was .05.

Results

Learning preferences, resources preferences, and the results of the impact of education programs will be reported sequentially.

Preferred learning format

A total of 63 respondents over five communities were interviewed regarding preferred learning formats, and responded as summarised in Table 3.

Yarning

More than two thirds of respondents (68.4%) preferred yarning as a means of sharing information. Interview responses preferring yarning included:

> [It's] better to have someone talking and explaining things face to face. (NSW/R.1)

> [We] get a lot of ideas from talking to each other. [its] Good that everyone gets the training and can share their experience.s (NT2/R.2)

> If someone comes up and describes to you about diseases it's better. (NSW/R.5)

> Telling is best for passing on information. I didn't know before, and I wasn't sure, but that lady came round and sat down and told me properly. (WA/R.9)

When a respondent also felt another learning style was important, yarning was often the preferred of the two:

> Both talking and doing important, but most important is talking. (QLD/R.20)

Practical Learning

'Doing', or practical learning, was cited as an important learning style by almost half of respondents (46.9%). Responses concerning the importance of practical learning included:

> [It's] easier to see behaviours in an actual dog [than in pictures]. (NT2/R.6)

> When my grandpa wanted to learn us something, he didn't look it up in a textbook, went out and showed us practically. (QLD/R.10)

Two respondents were highly in favour of a practical component to learning, stating that without the 'doing' element, talking was ineffective at changing any problems.

Visual Learning

Almost two thirds of respondents (65%) cited visual learning as an important learning style. Responses concerning the importance of visual learning included:

> People coming round and talking is good. Reading is alright [too], but seeing is good. People like to visualise. (QLD/R.21)

> Real things were best, photos were next best. (NSW/R.2)

> You can see what you need to do and where you need to get it from. It's more direct. (QLD/R.1)

> [Pictures] tells you more about things. (QLD/R.9)

> [I] can't read. … It's easy to see. (WA/R.4)

An important comparison was made by 10% of respondents, that visual learning is especially more effective that text in a learning resource such as a pamphlet:

> [Pictures are] better than text because it goes straight to the point, there's more info like with pictures. (QLD/R.9)

The idea that there was more information contained in pictures than text was also a recurrent theme, with 7% of respondents mentioning this, and other implying it. This was despite the researcher's (unstated) view that the text in consideration contained more facts than the visual resource.

Text-Based Learning

Less than a sixth of respondents (16.2%) cited text-based learning as an important learning style. Again, the preference of visual learning over text based learning was

TABLE 3

Learning Preferences Across the Five Communities

Community	*n*	Yarning	Visual	Practical	Text	Technological
NSW	12	6	9	12	0	0
Qld	25	16	14	13	2	4
NT1	7	6	4	1	1	1
NT2	9	5	4	5	3	4
WA	10	6	8	2	2	4
Total	63					
Overall per cent preference		68.4	65	46.9	16.2	14.6

expressed. Responses concerning the use of text-based learning included:

> People won't read, would rather look at pictures. (NSW/R.4)

> Some people don't understand the reading, but they can look at the pictures: [points at pictures] some dogs got germs. (NT1/R.6)

> A lot of people not really into reading, but will look at pictures. (QLD/R.7)

> Reading takes too long. (QLD/R.21)

> Some people can't read. Less writing, more examples, is good. (QLD/R.9)

Summary

Though individual preferences and community average preferences varied, respondents in all five communities stated preferences for yarning, practical, and visual learning as opposed to text based and computer/screen based learning. Yarning was stated as important by most (68.4%) respondents, followed by visual (65%) and practical learning (46.9%). Text-based learning was stated as important by 16.2% of respondents, and computer/screen-based learning by 14.6%. The preferred nature of physical resources was then further investigated.

Style of Resources Preference

When resources produced by veterinary surgeries were compared to locally produced resources in the Qld and WA communities, 70% (14/20) and 88% (14/16) of respondents, respectively, preferred the locally produced resource. Reasons for this preference included that the locally produced resource had more information because it was more visual and colourful, where as the more text dominant mainstream resources were felt to be obtuse.

When resources were created by different Indigenous communities were surveyed in the NT1 community, 53% (10/19) still preferred their locally produced resource, while 38% (6/19) preferred that produced by another desert community, and 16% (3/19) liked both. Though more respondents preferred their local resource, this difference was not significant at the low numbers involved. However, several people made statements that they liked to see dogs and places that they recognised in the resources, which emphasised a preference for local resources.

When different resources both produced locally were compared in the WA community, 60% (6/10) preferred a pamphlet format because it had more information while still being very visual and colourful, while 30% (3/10) preferred posters because they were more direct, do not require flipping through, and are very visual and colourful. One person thought both posters and pamphlets were needed because they liked the information and they liked the pictures too. Two other respondents made similar comments, but ended up preferring one over the other. In the NT1 community, the preference for flat verses folded formats was not notable. Three people in the Qld community preferred folded resources over flat ones.

The reasons given for these preferences across all the communities were largely the same: most respondents preferred the resources that were most visual, using pictures and colour.

Effect of Education Program on Community

Respondents reported and evidenced with their enthusiastic attendance a keen interest for the resource production and training workshops (Constable et al., 2011a). All workshop attendees ($n = 28$) reported that they had learnt skills they had not previously known, and during interviews six community members asked for copies of the resources produced. This evidenced that these methods were useful to engage the community in the program.

Resources themselves can also improve engagement with the dog health program, by being used to advertise the services. This allows residents to consider in advance what services they need to access and to organise their time effectively. Knowing in advance what services are coming when is an important part of having the community feel the program is answering their needs rather than being imposed on them. For both of these reasons, advertising can improve the interaction at the community–program interface.

To investigate this effect, residents were interviewed after a dog health program to determine the relative effectiveness of word of mouth, and poster resource advertising. The utility of solely word of mouth advertising was found to be low, with 6% (1/16) of people being alerted to the presence of a program in advance in NT1 community, through non-Indigenous council members. Through Indigenous council members in the Qld community, 24% (6/25) of people knew in advance of the up-coming program. In both cases, residents complained of not having enough forewarning of the offered services.

In a third community, the NSW community, a house to house survey was not possible, however, two attendees did complain about the lack of advertising for their dog program.

> There was no communication [about the program] here, there's nothing. Should do a letterbox run, have posters up to let people know. (NSW/R.12)

A third resident stated they felt word of mouth advertising was insufficient:

> Heard about the program too late, it's just by word of mouth that people know. (NSW/R.10)

Poster advertising had mixed results. In the NSW community, a black and white text-based poster was displayed in

some businesses to advertise the program, but apparently had not been noticed. The following year a mail out was combined with a colour poster as well as word of mouth, and there were no complaints about lack of advertising, and even some praise:

> Got a letter this year in the mail so that helped me get to youse. I wanted to get the dog done last year but was at the mission when you were here, and then when you was at the mission the dog was still at the village. (NSW/R.11)

The importance of knowing in advance the location and timing of the program was also illustrated by the following resident:

> I stayed home from work so I could get the dogs done today. (NSW/R.8)

In the WA community, when colour posters created by community members were used as advertisement, 67% (10/15) of respondents saw the posters and were alerted to the future program.

> [I] saw the poster so we knew the vets were coming. (WA/R.2)

> [I] saw the posters in the shop this time. Saw them last time too but a lot of people might not have noticed them. The colourful ones are better. (WA/R.7)

These results show that word of mouth should not be relied on to advertise the program. Posters can help, and likely stimulate further word of mouth awareness. However, a program should never assume that because posters have been issued, that everyone knows about the program and will arrive prepared for business on the first day. The physical presence of the program and its treated dogs is the best advertising, however, this is only effective if the program remains on the same site for several days.

Effect of Education Programs on Dog Health

The above data on learning and format preferences were used to generate education programs based on yarning, visual resources, and practical access to veterinary services. Their impact measured in terms of condition score and improvement of mange-like signs.

Mange-Like Signs

Nineteen program visits had sufficent data to be included in this study. Previous work had showed that programs which involved vets and DHWs collaborating were associated with a significantly improved prevalence of mange-like signs (Constable, Brown, Dixon, & Dixon, 2011). This article goes further to show that educational programs increased the impact of all programs on the prevalence of mange-like signs.

Regression anaysis further showed that across the board, programs including educational activities were associated with signifcantly greater improvements than programs that did not include education programs ($P = .008$).

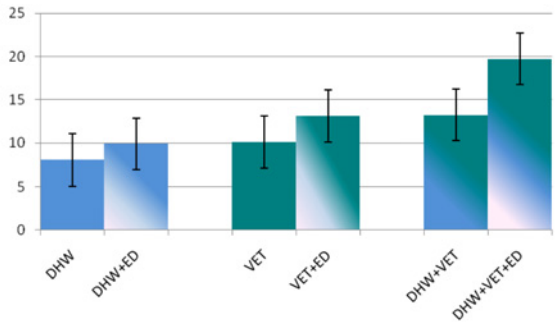

FIGURE 1
Effect of educational programs on improvement of mange-like signs.

Condition Score

Of these 19 program visits, 17 had sufficient data to be included in this part of the study. DHW programs did not have a significant effect on average condition score in this study. Their activites were mainly focused on treating for mange and removing unwanted dogs, and so did not directly target dog condition: so this result is not unexpected. However, the inclusion of an educational program was associated with a siginifcantly increased average condition score in both cases. In programs using a combination of veterinary, environmetal health and educational services, improvement in condition was likewise higher, though not signifcantly different from the VET+ED grouping.

Regression anaysis showed that across the board, programs including educational activities were associated with signifcantly greater improvements in condition score than programs that did not include education programs ($P = .02$).

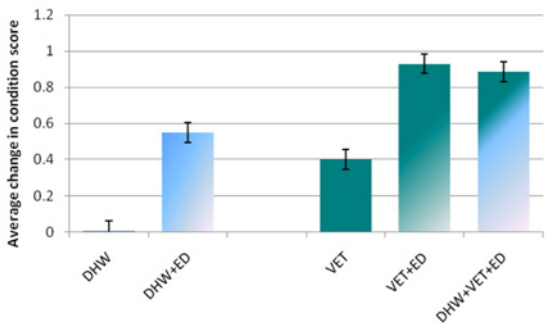

FIGURE 2
Effect of educational programs on condition score.

Learning Preferences

The three main learning preferences reported by adult respondents in this article agree with the results of Hughes et al. (2004), who investigated learning strengths in Indigenous school students. While all three main formats were important in all communities, individuals varied in their preference. For example, in three communities more people preferred technological learning to text-based learning, however, once all communities were averaged, text-based learning became more preferred over technological learning. This can be influenced by the previous learning experiences of respondents (Belzer, 2004).

The importance of yarning emphasises the importance of using local people, as they are well versed in local languages such as Aboriginal English and other components of Indigenous verbal interaction, as communication requires more than a knowledge of words and phrases: it requires an understanding of the cultural cues that go along with that (Kaplan, 1997). Local residents can be more easily trained in dog health knowledge and than outsiders trained in effective communication. Studies in the human health sphere agree that employment of trained local Indigenous residents in the health program is critical to ensuring community engagement and effective communication (Eley & Hunter, 2006; Grace & Chenhall, 2006; Nagel & Thompson, 2006).

The results also supported the use of images as an aid to verbal communication, as they can illustrate concepts that are difficult to convey with only words, and are often understood across different languages. This preference was mirrored in results showing why the locally created resources were preferred over generalised mainstream resources.

Though the importance of the visual was repeatedly reported, problems can still occur in the cross-cultural interpretation of visual imagery. For example, missionary illustrations of hell as hot and crowded appealed more to Papua New Guinean villagers than did images of heaven (Flannery, 1998). Also, some images may not be locally relevant, as Hughes et al. (2004) found in outback South Australia where images of briefcases and elevators were beyond the awareness of school children. This again highlights the need for involving local community members in the formulation of resources to ensure the correct messages are being conveyed by the images used.

Constable et al. (2011b) found that poster paintings produced in community were highly visual but nonetheless most still included text in the form of title or annotating text. This was used to a large extent to describe or label ambiguous objects like shampoo bottles or emphasise abstract concepts like kindness. Such use of text avoided interpretation errors while maintaining the primarily visual nature of the resource. Again, the particular words used must be chosen carefully to ensure they communicate the concepts in the most locally appropriate way. Involving local residents in resource production ensures that the appropriate registers are chosen. Further, in keeping with the preference for yarning and practical learning, visual resources could be most effectively used by having local language speakers explaining a concept with the aid of illustrative resources and practical demonstration.

Local Involvement

Constable et al. (2011b) showed that mainstream resources were significantly different in key aspects of design and content, and less relevant and appropriate than locally produced resources. They hypothesised that the mainstream resources were less likely to be effective. Indeed, the results here have shown that locally created resources were also preferred over generalised mainstream resources for these reasons. Local resources have a higher degree of cultural safety and competence (Nguyen, 2008).

As well as ensuring appropriateness, involving local community members in resource creation not only ensures knowledge sharing, it creates employment and a sense of ownership and pride, combating the apathy and shame of powerlessness. These outcomes help address social determinants of health, an important barrier in closing the health gap between Indigenous and non-Indigenous communities (Paradies, 2006). Health education programs that support active community participation can be more effective because, as well as engaging more effectively with the program, when people feel they are an active part of society, that they are able to contribute to and are valued by that society, their general quality of life and sense of well being is enhanced (Smith & Herbert, 1997). Health programs often do relatively little to build the infrastructure, knowledge, skill, and commitment needed in the community for long term community health (Wilkinson & Sidel, 1991), because they don't see it as their core mission. However, neglecting these issues will impact on the success of their more focused objectives.

Impact Evaluation

Education programs that engage local people, such as by creating local education resources, affect dog health programs in several ways. Firstly, the primary purpose of community-made health promotion resources is to improve dog health through a combination of increased engagement with services and healthy behavior change. This can be achieved not only in education program attendees but also in the wider community through using the resources created to promote awareness of healthy husbandry and upcoming health services. This advertising aspect is important to facilitate wider community engagement with the health services.

Secondary benefits include impacts on the program attendees through knowledge sharing, pride and employ-

ment during the process. In this study, community education programs showed evidence of impact in all three areas. The success of the process was demonstrated by the significant improvement in the health outcomes measured (prevalence of disease and condition scores). The improvement in average condition in veterinary programs is expected because one the main actvities of a veterinary dog health proram is desexing, a procedure that is known to be associated with increased condition in dogs (McGreevy et al., 2005).

However, the inclusion of an educational program was associated with a siginifcantly increased average condition score in both veterinary and DHW programs. In programs using a combination of veterinary, environmental health and educational services, improvement in condition was likewise higher than DHW or VET programs, though not significantly different from the VET+ED grouping. This could be because other factors such as the economic situation in that community is preventing further improvement in condition score. Moreover, continual increased in condition is unhealthy as the dogs will become obese, which is asociated with several adverse health effects (McGreevy et al., 2005). That progress in areas such as condition score was not strictly cumulative with each additional program partner indicates that these factors can only go so far to improve health. Other factors such as the economic capacity of the community and housing overcrowding must also be addressed. This is a finding echoed in papers in the human health sector (McDonald, Bailie, Grace, & Brewster, 2009).

Conclusion

In order to best cater to community needs and values, health education should assess community learning preferences. Generally, yarning, visual, and practical learning styles are those most likely to be dominant, however, individuals vary in their preferences depending on their learning history. Local residents should be employed in resource creation to ensure community engagement, and a sense of ownership, as well as to ensure appropriate and relevant resources in terms of topics, style, and content. If all of these factors are addressed then the resultant impact can be measured in terms of increased community awareness, engagement in the programs and dog health.

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About the Authors

Sophie Constable is a PhD candidate at the University of Sydney Veterinary Science Faculty, studying dog health education and training programs in remote Aboriginal and Torres Strait Islander communities. She received a Masters in Educational Studies from the University of Newcastle, a Graduate Certificate (Merit) in Indigenous Education from Charles Darwin University, Bachelor of Veterinary Science (Hons) and Bachelor of Science (Hons) from the University of Sydney. She is also Education Officer for Animal Management in Rural and Remote Indigenous Communities.

Roselyn Dixon is a tertiary educator with over 23 years experience in five universities in Australia and New Zealand. She has a background in teaching and researching publishing in diversity and inclusion of people who are disadvantaged or have disabilities. She is an experienced researcher and is particularly interested in mixed methods research projects. Her current position is the Undergraduate and Postgraduate Coordinator for Special Education in the Faculty of Education at the University of Wollongong.

Robert Dixon was a Senior Lecturer in the Faculty of Veterinary Science at University of Sydney. He was the first Associate Dean for Animal Welfare and held positions on many animal ethics boards inside and outside of the university system. Previous to this, he had a distinguished career as a veterinary virologist and microbiologist. He has published extensively in the area of ovine cancer viruses and hepatitis B viruses using the duck in collaboration with the McFarlane Burnett Institute in Melbourne. Dr Dixon passed away earlier this year.