Transforming knowledge: Adult understanding of human nutrition

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Abstract
Much of the popular - and academic - discourse about public attitudes to health and the need for more effective health communication have assumed what Wynne (1991) has called a 'cognitive deficit' communication model, in which it is assumed that lay people lack knowledge and awareness. An alternative 'social constructivist' approach to ordinary people's knowledge of health gives much greater emphasis to the often well developed, but informal experiences which people bring to public issues. This paper reports a pilot investigation in which we explore the use of computer-based methodologies to document the ways adults transform experts' knowledge.

Background: The public understanding of science and technology

Margaret Mead stated that families with children's feeding problems are families who have attended nutrition classes. Poor families do not have children's feeding problems; the child either eats or goes hungry.

Much of the popular - and academic - discourse about public attitudes to science and technology and the need for more effective communication have assumed what Wynne (1991) has called a 'cognitive deficit' communication model. Lay people, in this model, are lacking in knowledge and awareness, and this needs to be overcome by more effective forms of science communication, such as better school science courses, the use of television science or through science and technology centres.

An alternative 'social constructivist' approach to ordinary people's knowledge gives much greater emphasis to the often well developed, but informal experiences which people bring to public issues. An apparent ignorance about science and technology topics may mask a high degree of local knowledge (Layton, 1986; Lave, 1988; Wynne, 1991). One of the areas with a significant science and technology dimension is health in general and nutrition in particular.

Approaches to Learning
Educators are familiar with the shift in approaches to our understanding of school science and mathematics classrooms over the past decade. Much teaching in primary and secondary classrooms previously could be characterised in terms of a transmission model of education, in which the teacher wrote on the tabula rasa of a student; or, to use a cruder analogy, the student was seen as an empty vessel into which knowledge was poured.

A large body of research data, however, accumulated which strongly suggests that this view of learning is inappropriate. Researchers who have investigated students' conceptions of a variety of physical and biological phenomena have suggested, in the light of this accumulated evidence, that an alternative conception of learning is required. This alternate view is
commonly labelled constructivism

whose contemporary educational use is most commonly referred back
to Plaget's doctrine that knowledge simply cannot be "transmitted" or"conveyed ready made" to another person. Even when you seem to be
successfully transmitting information by telling it, if you could see the
brain processes at work, you would observe that your interlocutor is
"reconstructing" a personal version of the information you think you are
"conveying".

(Papert, 1993, p. 142)

Some of the large body of research in science education conducted within a
"constructivist" paradigm is summarised in works such as those by Driver,
Guesne and Tiberghien (1985) and Osborne, Freyberg and Bell(1985). A
similar approach is evident in mathematics education. For example, in A
national statement on mathematics for Australian schools there is the claim
that students "construct their own meanings, from and for, the ideas,
objects and events which they experience" (Australian Education Council,

This shift in conception of the role of the learner in schools is beginning to
be seen as a valid approach to adult understanding as well. For example,
Layton (1990) has described four lines of research which he labelled
Knowledge transformations for action; these are summarised in Figure 1.

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<th>Adult Science Literacy</th>
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<td>Transformation of scientific and other knowledge for use in specific contexts</td>
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Figure 1
Knowledge Transformations for Action
(Layton, 1990, p. 14)

In each of these lines of research, there is evidence that adults actively transform 'expert' knowledge into ways which makes it useful for them. That is, adults construct meaning for themselves as a result of interactions with the world. We believe that it is timely, in Australia, to develop strategies based on a view of adults which builds on their existing personal knowledge, as opposed to one which assumes the 'expert' message must be conveyed at all costs, regardless of any prior knowledge or experiences that adults have.

A number of research projects in the U. K. have investigated adult understanding of science and technology issues from such a perspective. Layton (1990), for example, discusses a number of examples in which the knowledge of particular adult groups has been investigated: parents of
children with Down's Syndrome; elderly people living alone and managing energy practices within tight budgets; local government elected representatives making decisions about methane seepage from a landfill site; and, adults living near a nuclear fuel re-processing plant. Wynne (1991) analysed the situation of hill farmers in the Lake District after the Chernobyl crisis and a group involved in a project on familial hypercholesterolemia.

In each case, the science and technology appears to be in little dispute among experts with whom the adults came into contact. In these examples, there appears to be a clear consensus about the knowledge offered by the scientists/technologists.

**Adults and Human Nutrition**

Human nutrition, in one significant respect, differs from the areas mentioned above. It does have a significant science/technology dimension. However, there appears to be conflicting 'knowledge' offered to the adult community by a variety of 'experts'. In addition, adults have a working knowledge of food (they are less likely to have such knowledge of, for example, nuclear physics or organic chemistry). Duff (1990) has drawn a distinction between 'nutrition-as-science', and 'nutrition-as-social-science'. Even 'nutrition as a laboratory science', which has "rewards in terms of prestige, remuneration, access to resources for research, and the legitimate claim to speak with authority" (p. 169) does not have the consensus enjoyed by many other areas of science and technology.

Nevertheless, the area of human nutrition is a particularly important one. The report commissioned by the Better Health Commission, *Towards better nutrition for Australians* (English, 1987) noted that: "The Commission considers nutrition ... to be an area where the definition of national health goals could have immense benefit". The booklet, *Food and nutrition policy*, by the Commonwealth Department of Health, Housing and Community Services (1992) begins with the statement: "Sound nutrition is a vital component of health" (p. 1).

A crude index of the importance of nutrition is provided by the number of serials devoted to this topic. *Ulrich's 1990-1 International periodicals directory* (1990) lists 244 serials under the heading of *Nutrition and Dietetics*. This does not include a number of serials which are categorised under other headings (such as *Agriculture, Food and Food Industries, Physical Fitness and Hygiene, and Gerontology and Geriatrics*). Among the 244 serials listed are newsletters and magazines (such as *Garlic Times: The newsletter of lovers of the stinking rose*, with a circulation of 5 000) and journals such as the *American Dietetic Association Journal*, with a circulation of 61 000.

**Sources of Nutrition Messages**

One of the characteristics of the area of nutrition is the wide variety of intermediaries who take scientific information from 'experts' (medical scientists, epidemiologists, dietitians, nutritionists, biochemists) and 'simplify' it for the public. These intermediaries may include: general practitioners, home economics teachers, health education teachers, primary school teachers, athletics and sporting coaches, health promotion officers, naturopaths, homeopath and 'self proclaimed nutrition gurus'. Figure 2 is an attempt to represent the bewildering array of influences in this area. The
level and type of nutritional science information offered to the community will, to some extent, be determined by the level and type of science education of these intermediaries. Other intermediaries, such as grandparents and parents, hold their position by virtue of their age and experience in feeding their families.

The importance of the media was highlighted in a survey of 499 shoppers, who nominated *magazines* (37 per cent) and *television* (33 per cent) as the two most frequently used sources of nutritional information (Worsley, 1992). If advertising in these media is a primary source of information, then, as Crotty (1988, p. 489) wrote, among those things which you would expect adults to believe are:
1. Dribbling soft drinks makes you manly.
2. Drinking flavoured milk on the beach makes you sexually attractive.
3. Intelligent mothers used canned baby foods.

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**Figure 2**
Possible Sources of Nutrition Information for Adults
A Tradition of 'Telling Them'
Clements (1986) noted, in a history of nutrition in Australia, the common view that to get changes in nutritional practices, all you had to do was 'to tell people to do it' (p. 229)

Consider the common advice to the community, *Choose low salt foods and use salt sparingly* (National Health and Medical Research Council, 1993). In relation to the role of salt in the human diet, Bender (1985, p. 173) noted that

There is some evidence that about 15 per cent of the population is born with the inherited ability to increase blood pressure later in life if they have an excessive salt intake. . . . If we all take less salt, some of us will benefit. It cannot do any harm to reduce the quantity we consume and it might do some people a great deal of good.

The advice to reduce salt intake is generally not presented in the way Bender does. Rather, it is in the form of the statement, *Choose low salt foods and use salt sparingly*. Is such advice, without qualification, counter-productive? Does such advice assume a 'cognitive deficit' model of adult learning?

The National Health and Medical Research Council (1993), similarly advises a reduction in fat intake. In relation to fat, Farrands (1993, p. 126) wrote:

a slight change in diet is not much of a price to pay for an insurance policy against what just might be a problem, and most people are by now paying that price by attending to their diets. While doubt remains about it, however, it is yet another occasion not to panic; certainly not to feel guilt at the slightest taste of a little fat.

Or, as Bourre (1990, p. 29) more colourfully, stated

We are under the heels of the terrorists of "nutritional scientism" - sad, austere, stiff and dry, puritan and rigid, claiming to be rigorous but always severe - who oppress us supposedly for our own good.

The two examples (salt and fat) cited above suggest that even nutrition-as-science should not lead to simplistic assertions about human diets. Further, there is an important role for nutrition-as-social science. For example, McGuckin (1993) in her brief review of the history of nutrition has suggested that there have been many layers of meaning, including the mythical, religious, folklore, early medical, emerging age of scientific enlightenment which preceded the current (twentieth century) science of nutrition. Thus there may be competition between scientific forms of knowledge versus social, psychological, cultural, sensual and other forms of knowledge. As Stanton (1992, p 5) wrote: "I am delighted that the food which nourishes and sustains the body can give such joy to the senses"; such sensual aspects of food may be as important as the nutritional aspects of the same food for some in the community. Ripe (1993, p. 59) spoke more colourfully of the 'bliss point': "It's the gustatory equivalent of the G spot, the point at which a taste is 'just right'. It hits the mark . . . this 'bliss point factor'."

There is, too, the wider issue of 'body image': as Llewellyn-Jones (1993, p. 6) wrote:

Everybody is interested in their body, not necessarily for reasons of better health but because a good body shape is equated with better self-esteem and with 'success' in relationships.
This is a large topic which cannot be dealt with adequately here: see for example, Coward (1984) and Jacobus, Keller & Shuttleworth (1990) for a more complete treatment.

**Human Nutrition: The Literature**

The literature suggests a number of issues which need to be considered in relation to human nutrition. Among these are the following.

*Additives and preservatives* There is widespread concern about chemicals, in the sense of additives or preservatives, in food. The study of 499 shoppers referred to earlier (Worsley, 1992) reported that 74 per cent nominated chemical additives in food as a 'very important' issue. This concern has led to the publication of books such as *How safe is our food?* by the Australian Consumers' Association (1991), and manuals such as Hansenn's (1989) *The new additive code breaker*, which allows consumers to identify, for example, 251 as *sodium nitrate*. This issue is closely linked with the *natural versus processed* debate (see below). The literature suggests that for some in the community at least, natural materials are not categorised as *chemicals*.

*Natural versus processed* The issue of *natural* or *not natural* is a particularly important one. Bender (1985) has identified the following four meanings of *natural*. (1) The first meaning refers to a food which is not processed in any way, such as raw fruit (is cooling to be regarded as a form of "processing" in this context?). (2) The second meaning relates to improving the appeal of one product over another: butter is natural, margarine is not. (Neither is "natural", of course, in the first sense of the word.) (3) A third meaning relates to the degree of processing: thus, brown sugar is "natural", white sugar is not. (The difference, in actual fact, is slight!). (4) The fourth meaning is as an antonym for "artificial": some shops, for example, sell "natural" vitamins. On this issue, Coward (1989, p. 39) wrote: ‘Nature’ is a particularly loaded concept in alternative approaches to health. Nature is no longer scenery, the countryside or wildlife... Nature is vital forces and energies running through all things... The main source of knowledge of these forces is the individual body.

The view of nature here is mystical. She observed, too, that: "The dream of transforming individual health, and therefore society, by eating a 'natural diet' is virtually meaningless" (p. 148).

*The validity of sources of nutrition information* People are concerned about the truthfulness of information: can the source be believed? People are sceptical because manufacturers make claims to sell their products. Worsely (1992) reported the views of a sample of shoppers. Among those who were trusted ‘a lot’ were: the National Heart Foundation (86 per cent), dietitians (72 per cent), family doctors (66 per cent), and departments of health (63 per cent); food manufacturers (3 per cent).

*Format of information* People want to be able to use the information easily, especially at the point of purchase. Important questions include: Is this information I want? Is it in a form I can use? Is it in a form which is relevant to my needs? How easily can I understand it? How quickly can I understand it and make a decision on whether the product is good/harmful for me? What exactly will this ingredient do for me? Leggett and Leggett (1989, p. 25) wrote
relevant labelling is either non-existent, inconsistent or unclear... quantities of fat, sodium and sugar are not interpreted as to whether they are high or low in terms of accepted dietary guidelines.

**Probing the Transformation of Knowledge**

The significance of this project lies in the attempt to go beyond the broad brush surveys which assume a cognitive deficit approach and to elucidate the often entrenched attitudes and informal knowledge which shape ordinary people's approaches to human nutrition. Much of the literature dealing with 'the public understanding of health' approaches the issue from the point of view of the disseminators of health knowledge. The recently-published *Dietary guidelines for Australians* (National Health and Medical Research Council, 1993, p. ix), for example, notes that: "Nutrition is a complex science and communication of its messages demands more information than can be given in brief statements". The problem is seen as one of finding the best way to impart information.

Our primary aim in this project, then, to document and to understand the ways in which adults transform public information about human nutrition.

This pilot project was funded by a Murdoch University Special Research Grant, and began in February 1993. We began by exploring the most appropriate methodology which would help us answer the questions we have posed.

**Methods**

We began this project by exploring ways which would allow us to document some of the processes used by adults in transforming 'expert knowledge' about human nutrition.

Adults are often presented with statements about nutrition such as those by the National Health and Medical Research Council (1993) cited above. What are they to make of these statements? We sought preliminary answers to this question by providing adults with a nutrition 'dictionary'; this is a Hypercard-based stack which allows respondents to browse. The source of the nutrition information is identified, so that when respondents browse, they can choose from among a range of 'experts'. For instance, in the dictionary information is available from the sources such as the following: a nutrition textbook, a biochemist, a well-known nutritionist (Rosemary Stanton), a medical article, a women's magazine article, a newspaper article, a pamphlet from the Health Department, an athletics magazine article, a health magazine (*Well Being*) article, advertising from the CSR dietitian, an article by a naturopath and so on. Other hypertext searching facilities have been included to enhance the efficiency of the search. The stacks contain a tracing feature which records which cards respondents use, and for how long. This information will, hopefully, help us to identify some of the thinking processes used by respondents.

**Pilot Phase**

In April, 1993 we began with a group of student volunteers at Murdoch University.

There were two elements to our procedure: a questionnaire and a 'dictionary' which was a Hypercard stack of nutrition information gleaned from various
sources. We experimented with having students type responses on the questionnaire, which was administered by computer. This required students to move between the questionnaire and the dictionary. We also tried having the interviewer type the questionnaire responses, with students instructing the interviewer to move around the dictionary. Several students, all of whom had experience with computers, expressed frustration at the process of going back and forth between the dictionary and the questionnaire. For that reason, we produced a paper version of the questionnaire, so that students could concentrate on locating information in the dictionary, as they required. This removed the need to move between the dictionary and the computer-administered questionnaire. In each case, the part of the interview which required extended responses was audiotaped.

The final method chosen was to provide the questionnaire on paper, together with the Hypercard-based dictionary for browsing. Questionnaire responses requiring extended responses were audiotaped. This approach resulted in an interview format which respondents found comfortable. Most interviews could easily be finished in 40-45 minutes, the exceptions being those respondents who, because of a personal interest in nutrition and food, wanted to talk at greater length.

When all the students had been interviewed, the questionnaire was edited, the dictionary expanded to included more information (taken from various sources) and trialed with an off-campus group of adults.

**Community Phase**
We contacted a number of community groups to locate some volunteers for our study. The two groups which responded favourably were members of a yoga class and members of the Nursing Mothers’ Association. An approach to a local soccer club proved fruitless.

Each of the volunteers was given the revised questionnaire, and the revised Hypercard dictionary.

**Samples**

**Pilot Phase** Twenty-five students at Murdoch University were interviewed in the pilot phase of the project. All were volunteers, and in no sense a random sample of university students (let alone of adults in general). Seventeen were first year students. The remainder in the final year of their studies; four of these had studied the equivalent of three years of science (physics, biology or chemistry).

**Community Phase** Nineteen women were interviewed in their homes. These were either from the yoga class or from the Nursing Mothers’ Association. All were volunteers.

**Discussion**

**Analysing the Data**
We are currently developing procedures to analyse the data we have gathered. We are exploring the use of the NUDIST computer program (Richards *et al* 1992) for this task; this program is suited to the analysis of interview transcripts. For each respondent, we have three sets of data: biodata; interview transcripts; and, a record of the respondents’ browsing of the dictionary.
A preliminary analysis of the student response data suggests that among the categories to be explored are: Body Mass Index (BMI); 'Nutritious' Food; Food Labels; and, Energy in Foods.

Theoretical Frameworks
There can be no doubt that adults do not simply receive and act on expert knowledge; rather, they actively transform the knowledge. We must reject the proposition that our task is one of searching for the best way of transmitting expert (nutrition) knowledge. This search is as fruitless as the search, in previous decades of educational research, for the best teaching method.

A theoretical framework which may prove useful in this area is constructionism, which Papert (993, pp 142-143) claims is "my personal reconstruction of constructivism". He explains that constructionism has as its main feature that it looks more closely than other educational -isms at the idea of mental construction. It attaches special importance to the role of constructions in the world as support for those in the heads, thereby becoming less of a purely mentalist doctrine. (pp. 142-143)

Papert suggests that constructionism invites us to ask questions such as
How can one become an expert at constructing knowledge? What skills are required? And are these skills the same for different kinds of knowledge?
(p. 143)

There are echoes of this conceptualisation in Lave's (1988) study of cognition in practice: a study of adults using mathematics in everyday contexts. She urges strongly "a rethinking of the nature of direct experience" (p. 182). In her view, such experience is devalued by what she calls the 'cognivist view', in which higher cognitive functions are presumed to be further away from the body and from "intuitive, concrete, context-embedded" experience. . . . The only "good" experience was distanced and generalized, removed from the debilitating influence of immediate time and place in the form of abstract accounts of action. (p. 182)

Theoretical frameworks which value such direct experiences, and suggest that 'practice in theory' needs to be developed, may prove to be a fruitful approach in studies of adult understanding of human nutrition.

References

Commonwealth Department of Health, Housing and Community Services (1992) Food and nutrition policy. Canberra: AGPS.
National Health and Medical Research Council (N H & MRC) (1993) Dietary guidelines for Australians. Canberra: AGPS.