ADULT SCIENTIFIC AND TECHNOLOGICAL LITERACY:
A REVIEW

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INTRODUCTION

"Science education in crisis" is currently a popular catchcry. Western politicians urge industry to be more technologically efficient. The pace of change, including technological change, is increasing. "Citizens need to be scientifically and technologically literate", we are told (see, for example, the special issues of the Bulletin of Science, Technology and Society (1986, 6 [2 & 3] and 1987, 7 [1 & 2]).

What is "scientific and technological literacy"? Are they two concepts or one? How do people in the community become more "literate" in science and technology? What is the role of the school and non-school agencies (such as the media) in raising the scientific and technological literacy level of the community?

It is useful for this discussion, first, to provide a framework for the various sources of learning in science and technology. These sources may be categorised as "school" or "out-of-school". In each of these two categories, the provision of learning may be "formal" or "informal". Formal sources of learning are those which set out intentionally to educate; informal sources are those which educate "accidentally" (Lucas, 1982). Thus, the school provides "formal" learning opportunities in a science class, and "informal" opportunities in a science club. The "formal" classroom provision of science learning tends to be tightly structured, with the specific intent (generally) of achieving pre-determined objectives. The "informal" source of learning (the science club) is generally much less structured and often has a much greater emphasis on enjoyment as an important objective. In a similar way, an "out-of-school" source of learning may be "formal", as in a museum (in which there is a deliberate attempt to educate), or "informal!", as in a play, a novel, a film or a television programme. The framework for the various categories of sources of learning are summarised in Table 1.
TABLE 1
A Classification of Sources of Learning
With Examples

<table>
<thead>
<tr>
<th>FORMAL</th>
<th>INFORMAL</th>
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<tbody>
<tr>
<td>School science class</td>
<td>science club</td>
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<tr>
<td>Out-of-School museum</td>
<td>novel/play</td>
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Let's now consider some of the meanings given to 'scientific and technological literacy'.

**Scientific and technological literacy: What are they?**

The concept of "scientific literacy" has been around quite a while, so let us examine it first. It has been defined in many different ways: a sample of views is as follows.

> gaining scientific literacy is a matter not merely of evolving from primitive ideas to complex ones, but of tearing out and replacing a whole, originally functional world picture, with all its concepts, hypotheses and metaphors.

(Holton, 1984, p. 6)

These two dimension together - an understanding of the norms of science and knowledge of major scientific constructs - constitute the traditional meaning of scientific literacy as applied to broader populations. But if scientific literacy is to become truly relevant to our contemporary situation, one additional dimension must be added: awareness of the impact of science and technology on society and the policy choices that must inevitably emerge.

(Miller, 1983, p. 31)

We may define science literacy as an acquaintance with science, technology, and medicine, popularized to various degrees, on the part of the general public and special sectors of the public through information in the mass media and education in and out of schools.

(Shen, 1975, pp. 45-46)

Clearly, a wide range of elements is included in the concept of various authors. How are we to make sense of this bewildering range of views of "scientific literacy"? Some, like Maarschalk (1986), have abandoned the attempt, and instead have chosen to focus on selected aspects of scientific literacy. We must bear in mind, however, the consequences of illiteracy; in the words of the Australian Minister for Science,