

Continuing Science Education of the Global Public

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INTRODUCTION

Continuing education constitutes an important aspect of furthering the process of learning beyond the formal years of schooling. Leveraging mainly on the individual's penchant for self-improvement, it fulfils a useful role in endowing skill sets and other competencies to a person. Continuing education has largely remained the mainstay of tertiary institutions, commercial schools and adult education centers. An entire gamut of evening courses catering to diverse interests is offered here.

The need to keep abreast of continuing developments in science and technology is important in today's society, as science and technology are regarded as agents of socio-economic development for a country (Tan & Subramaniam, 1999). From an institutional context, science and technology centers have been performing an admirable role in popularizing science and technology among the masses (Tan & Subramaniam, 1998; Delacote, 1999; Subramaniam, 2003). Attendances to science and technology centers have been increasing over the years, and more science and technology centers are being set up in various countries (Tan & Subramaniam, 2003a). One aspect of the continuing education of the public that has not been given adequate attention is the need to address the public's queries about science and technology. Addressing these queries constitutes an important aspect of furthering the promotion of science and technology among people. No proper institutional mechanism exists to fulfill this need, probably because of the cost, manpower and diversity of resources needed to service such learning needs. This may well have been the case up to a few years back, when the Internet was still a fledgling infrastructure. With the reach and hold of the Internet now extending real-time across the world, the marshalling of manpower and resources is no longer a problem, and connection to a vast knowledge

base is possible within a few seconds to anyone with a personal computer and network connection.

This article describes a university-science center partnership called Science Net, which has been functioning as a Web-based institution for the continuing (science) education of the global public in general and the Singapore public in particular since 1998. The global public, including students, can seek answers or explanations to any of their scientific queries, doubts or misconceptions via this forum (Tan & Subramaniam, 2004). Science Net is hosted on the Web site of the Singapore Science Centre (www.science.edu.sg), an institution for the popularization of science and technology, and is not to be found in the portals of other science centers or science museums. Science Net provides access to a rich knowledge repository of more than 6,000 questions and answers on various aspects of science and technology—these represent the authored products of the scientific community in Singapore.

BACKGROUND

The Singapore Science Center has been popularizing science and technology to students and the public in multi-dimensional ways since its establishment in 1977. *Singapore Scientist*, a best-selling science magazine that the center has been publishing since its opening, has a popular section called "The Scientist Answers." In this section, students get their doubts in science answered by the scientific staff of the science center. However, the quarterly nature of this print publication means that only a limited number of questions can be answered in any issue. On an average of five questions and answers per issue, this equals about 20 questions and answers a year, or 200 questions and answers in

10 years. And the huge pile of questions awaiting answers means that a valuable opportunity is foregone to address learning needs.

When the Internet became a buzz word in the mid 1990s and Internet penetration rates in Singapore started to increase, especially with the establishment of a broadband network (Tan & Subramaniam, 2001), a decision was made to open a virtual annex of the science center. The utility of a virtual annex for science centers has been well recognized internationally (Jackson, 1996; Orfinger, 1998; Bevan & Wanner, 2003). The virtual science center in Singapore features information about the science center, virtual exhibits and a range of science learning resources (Tan & Subramaniam, 2003b; Tan, Subramaniam, & Aggarwal, 2003). Among the science learning resources featured here is the online equivalent of “The Scientist Answers,” called Science Net. A major reason for instituting this section is the need to encourage the public to keep abreast of developments in science and technology through a platform for use in clarifying any doubts they may have in science and technology. Freed from the frequency schedule and page limitations of the print medium, the Science Net has enabled “The Scientist Answers” section to be scaled up dramatically on the Web. In fact, the number of questions and answers published in the first 20 years of the print “The Scientist Answers” section was exceeded within the first few months of operation of Science Net!

The Science Net is a good example of a “learner interaction with the experts” forum. Published studies on the effectiveness of learner interaction with experts are, however, lacking in primary journal literature, probably because the field is new and still evolving. While Science Net is unique in that it is the only such forum to be hosted on the Web of a science center or science museum and is backed by a large ensemble of scientists, there are other variants of this service on the Web. For example:

1. **Ask the Experts (www.sciam.com/askexpert_directory.cfm):** Administered by *Scientific American* magazine, this service features nine categories in science. An average of one answer to a question is posted every week.
2. **Ask Dr Universe (<http://druniverse.wsu.edu/sendquest.asp>):** Hosted by Washington State University, one can ask any question—not just in science—and answers will be obtained from

its faculty. However, the database of questions and answers is not large.

3. **Ask The Experts (www.physlink.com/Education/AskExperts/):** This site caters to questions and answers in physics and astronomy. The database, however, is not large.
4. **ScienceNet (www.sciencenet.org.uk):** Hosted in the United Kingdom, this site features questions and answers on a range of science topics. However, it entertains questions only from within the United Kingdom.

These Web sites, though serving a useful purpose, do not provide as comprehensive or as frequent a coverage as Science Net, which reaches out to both generalist and specialist audiences. Some of the sites have restrictions—for example, ScienceNet entertains questions only from within the United Kingdom.

DESIGN OF SCIENCE NET

The database of questions and answers in Science Net is organized according to broad schema and sub-classifications: seven categories and nearly 70 sub-categories (Table 1).

The hierarchical classification system is more a reflection of the need to categorize the thousands of questions and answers into a logical format that would permit ease of retrieval. From an operational standpoint, the categorizing of content in multifarious ways has the advantage that visitors need not download entire files in order to access the database—this would be rather time-consuming on a slow network.

The use of a simple layout, presence of a design motif without flamboyant elements, minimal use of colors and graphics, and use of simple fonts to present information contributes to the aesthetics of the site. Also, multimedia is not featured in the section. These strategies help to minimize eye discomfort and make the appropriate subset of the section less bandwidth-intensive for access—significant considerations in ensuring that the site stays breezy and popular.

Navigation aids are provided on all pages, and this helps visitors migrate from one category to another seamlessly.

A noteworthy aspect is that the section is updated almost every day—an important consideration in ensuring its dynamism and vibrancy.

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