Review articles

Future proofing education

Malaysia focuses on sustainability

Educational sustainability can mean two things: sustainability of education and education for sustainability. Malaysia – an export-led economy driven by industrial and technological progress – has ambitious plans for further economic development as far ahead as 2020. The government aims to strengthen creativity and innovation by improving the education system. Of course, economic plans have resource implications, and one of the most promising ways of delivering an innovative learning environment is through e-learning. This raises the question of how economic and educational development can be sustained, and the role of e-learning in achieving and maintaining sustainability.

What is sustainable e-learning?

Educational sustainability means bringing together:

- e-learning; and
- sustainable development.

Online learning that meets both present and future needs is – from an environmental perspective – sustainable e-learning. From an educational point of view, e-learning has several advantages:

- Data mining means content can be searched for meaningful information.
- Learning tools can be accessed through the Internet.
- As Web tools become smarter, people can do more with them.
- There is an iterative process of use, feedback and redesign of content.
- This sets up a learning loop that improves course design and e-learning content progressively over time.

Sustainable e-learning:

- makes use of all the advantages the technology can deliver;
- maintains or improves teaching quality; and
- at the same time reduces unit costs.

From an environmental perspective, sustainable e-learning meets both present and future needs. It can reduce the impact on the environment by reducing carbon emissions and form a bridge between sustainable development and e-learning. In economic terms, sustainable e-learning can increase institutional profitability through low-cost technology.

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Smarter Web tools: the Semantic Web

Internet development has now reached a point where users can access intelligent features – the "Web of data" or "Semantic Web" is personalization-driven. Web 3.0 tools can be personalized, with smart agents providing information and links to help individuals locate relevant resources. As the Web changes and new features become available, there will be further evolution in e-learning.

E-learning 3.0 uses artificial intelligence to help students get a better understanding of the learning process. It can support mobile technology and create a personal distributed learning environment that includes selected applications, offering:

- flexible learning activities;
- better student engagement; and
- better support for distance learning.

So, active learning and choice of learning opportunities can give students a strong sense of ownership of education and also means a changing role for those who teach them.

Malaysia focuses on sustainable e-learning

Malaysia today aims to produce innovative, entrepreneurial graduates and also wants to use education solutions to support a sustainable environment. As part of the drive to increase capacity for knowledge creation and innovation, most of its universities have established their own e-learning systems. They:

- offer Internet-based degree programs;
- deliver learning materials online; and
- promote knowledge sharing, information exchange and collaboration through workshops, seminars and conferences.

Within Malaysia itself, there are two initiatives related to e-learning:

1. An e-learning implementation framework developed by the Malaysian government for the higher education sector. This focuses on areas such as administration and course content rather than sustainable development strategy or technology innovation.
2. An e-learning evaluation framework. This discusses the individual, knowledge, learning and content but not sustainable development, strategy and technology innovation. As yet, no data collection has taken place.

A literature review reveals growing interest . . .

One researcher wanted to know how much research there was worldwide on sustainable development and e-learning in higher education. They felt there was a need for a framework combining the essential elements of:

- e-learning;
- technology application;
- sustainable development; and
- teaching and learning principles.

So, they used four of the best-known electronic databases to conduct a review of academic research and identify content related to each of these areas. E-learning publications first emerged in the 1990s, but articles about sustainable development only started to appear in 2002. Increasing interest in sustainable e-learning resulted in more articles being published from 2007 onward. Searching Emerald, ProQuest, ScienceDirect and SpringerLink produced 170 articles with keywords such as e-learning, Web 3.0, sustainable development and sustainable education.

Analysis by topic, publication date and outlet revealed some interesting information:

- The most extensively researched area – the subject of 63 published articles – was e-teaching and e-learning, and more of these focused on the technology rather than on sustainable development.
- Of the 45 articles that concentrated on the technology, half dealt with Web evolution and just 10 with intelligent agents.
- Only 14 of the 170 articles mentioned the application of sustainable e-learning.

. . . and also several gaps in the research

Most of the articles focus more on e-learning than on sustainable development. And little research has been conducted in Malaysia on the relationship between e-learning and sustainable development.

In all, the study identified seven frameworks related to research carried out worldwide, including the two from Malaysia dealing with e-learning. Between them, they covered some aspects of sustainability and of e-learning, particularly e-learning content, administration and the learning process.

However, they did not pay much attention to:

- sustainable development;
- technology innovation;
- application and software components; and
- mobility and intelligent agents.

Creating a framework for sustainable e-learning

This literature review gives insights into the characteristics of sustainable e-learning. By identifying gaps in the existing research, it draws attention to the factors that need to be considered in any generic framework. So the key elements should include:

- e-teaching and e-learning principles and practices;
- green technologies such as the Semantic Web and intelligent agents;
- applications that support mobility and personalization; and
- sustainable development – in both educational and environmental terms.

It is essential to be able to add new elements at a later stage so as to keep pace with developing technologies and a changing environment. Drawing on broader concepts and connecting principles will ensure that the framework remains flexible and does not become

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obsolete. As a result, it can provide guidelines and recommendations on integrating technology applications with teaching and learning practices. This research was motivated by the challenges associated with Malaysian higher education. But the approach can be used in any country as the basis for a sustainable e-learning system.

Comment

Keywords:
Higher education,
Malaysia,
E-learning,
Semantic Web,
Sustainable development,
Internet technology

This review is based on "Sustainable development, e-learning and Web3.0" by Mohamed Sofiadin (2014). In this article, the author explains how research interest in sustainable development and in e-learning has developed in recent years. A literature review based upon academic publications held in online databases considers the focus of existing research and identifies a number of gaps. This then provides the basis for a preliminary framework to guide the development of sustainable e-learning in higher education in Malaysia and elsewhere.

Reference

Mohamed Sofiadin, A.B. (2014), "Sustainable development, e-learning and Web3.0", *Journal of Information, Communication and Ethics in Society*, Vol. 12 No. 3, pp. 157-176.