

Examining E-Learning in Environmental Technology Management Websites

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Abstract

The paper examines the role of online resources for environmental technology management (ETM) learning by examining major influential websites, such as that of the World Business Council for Sustainable Development and the International Institute for Sustainable Development. It analyses from a pedagogical perspective the role of the Internet presence of the global business and institutional communities in promoting and facilitating the management of environment technologies. The analysis suggests that most of the websites for ETM include resources, but do not provide opportunity or encourage active online learning. Learning support and learning tasks should be an integral part of website design in order to create real impact and change existing perceptions and practices.

Introduction

Environmental technology management (ETM) is still an emerging area of education and learning for the tertiary and university sector. It is extremely encouraging that a number of professional institutions have started recently to offer qualifications in this area. Examples are: Pennsylvania College of Technology with Bachelor of Science (BSc) in ETM (since 2005), Arizona State University with BSc in Industrial Technology: Environmental Technology Management and Masters of Science and Technology with concentration in ETM (including online), California State University Bakersfield with BSc in ETM (online), Utah Valley State College with a technical area in ETM as part of a BSc Degree in Technology Management.

This short list would be very close to be exhaustive unless we consider the immense power of continuous learning through the corporate, government and non-government sectors including the Internet teaching and learning resources, which are of particular interest to this paper.

Since the 1990s resources available online through the World Wide Web have become a major part of the on-going learning process across all ages and institutions. The Internet can potentially be very influential in promoting and facilitating changes in attitudes towards the use of technologies (Harasim, Hiltz & Turrof, 1995; Garrison & Anderson, 2003), and particularly pedagogical sound technologies (Reeves & Harman, 1994). The sustainability agenda requires fast cultural changes at all levels in society and a reassessment of how we do business and its impact on the environment. The Internet has the potential to be a strong influential tool in this direction. The aim of this paper is to describe and critically analyse the progress made in reaching the global virtual community and contribute to the greening of learning, with a particular emphasis on environmental technology management.

The approach we have taken is to analyse from a pedagogical perspective the most popular and valued Internet sites that deal with issues of sustainability. Although these sites were not specifically designed for educational purposes, the potential they offer for online learning is enormous. They also contribute to the establishment of network communities of learners and learning organizations who can significantly influence the development, adoption and management of environmentally sound (sensitive, friendly, healthy) technologies. Such networks expand synergistically the resources available within one particular organization and allow everybody to draw on global knowledge, expertise and experience as to how best to contribute to the sustainability agenda.

According to Ashford (n.d.), the transition to sustainability requires the corporate sector to address the following questions related to technology management:

- what are the current technologies (eg in manufacturing, extraction, transportation, services, agriculture, energy generation, waste management) that present significant sustainability problems;
- do such technologies exist, can they be adapted or do they need to be developed;
- which firms or organizations are in the best position to provide such technologies;
- what policies need to be put into place to encourage the transition to the desired technologies.

The issues of ETM clearly belong to the sustainable development area. However, more recently they have been linked to terrorism, disaster management and emergency interventions because the technological choices we made and how we manage technology affects the flexibility and robustness of the life styles we have created. For example, a centralised energy

system built around fossil fuels technology (as most grid systems in the developed world are) is not only unsustainable from an environmental point of view but can be an easy terrorist target and can pose difficult disaster recovery challenges.

Addressing these issues on the Internet learning sites would be a significant step towards building knowledge about environmental technology management. In this paper we would like to examine to what extent this is happening. How useful are the online teaching resources for the purpose of enhancing the understanding on sustainability issues?

Pedagogical Requirements for Online Learning Websites

Before examining the particular selected websites whose purpose is the spread the message about sustainable development and the use of technology, it is important to have a clear picture of what constitutes an effective learning environment. The learning resources in an educational setting are concerned with the learning tasks which will cause the learner to engage with the material in a meaningful way and achieve a learning outcome. Oliver (1999) presents a framework which identifies and distinguishes between three critical elements of the learning setting that equally apply in the case of online learning, namely:

- the learning tasks;
- the learning resources; and
- the learning support.

The lack of one of these three crucial components would impede the efficiency of the learning and would delay the achievement of the educational/learning objectives. For example, it is not enough to have the resources available without encouraging the learners to undertake specific tasks and provide the needed advice and support. Alternatively, providing only tasks without the necessary resources is equally inefficient from a pedagogical point of view (Reeves & Harman, 1994).

In relation specifically to online learning, Oliver and Herrington (2001, p.114) provide a checklist of items that can be used to assess the quality of resources, tasks and support available on websites. This includes:

1. Accessibility that examines whether the information is organised in ways that make it easily accessed and located;
2. Currency that examines whether the age of the materials is appropriate to the subject matter;
3. Richness that examines whether resources, tasks and support reflect a rich variety of perspectives;
4. Purposeful use of various media that examines whether the electronic media is suitable for the intended purpose of the learning process;
5. Inclusivity that examines whether materials demonstrate social, cultural and gender inclusively.

The above criteria correspond completely with the sustainability concept, which argues for transparency and accessibility to information (item 1 from the above list), appropriateness of solutions to the local environment (2), acknowledgement and respect for diversity (3), good communication of the issues (4) and a holistic approach (5). It is this framework that we are going to adopt in analysing the websites offering opportunities for online learning in ETM.

Websites Visited

The amount of web resources directly aimed at encouraging environmental technology management learning is very limited; in effect the majority of them refer to the limited provision by the higher education sector. There is however a myriad and growing number of websites that address the issues of sustainability. A 2004 Globscan survey of web pages (WBCSD, 2005) shows that the sites most valued by sustainability experts from a business and organisational point of view are the ones provided by: the World Business Council for Sustainable Development (<http://www.wbcsd.ch>) valued by 40% of the experts, the International Institute for Sustainable Development (<http://www.iisd.org>) valued by 28%, various United Nations sites (www.unep.org, www.un.org/esa/desa.htm, www.unglobalcompact.org) at 27%, the World Resources Institute (www.wri.org) and SustainAbility (www.sustainability.com) both at 10%, GreenBiz (www.greenbiz.com) at 8% and Business for Social Responsibility (www.bsr.org/) at 5% (see Figure 1). The popularity of these websites among the experts across 40 countries in Europe, Asia, the Americas, Africa and the Middle East, should also be acknowledged taking into consideration the fact that the survey did not prompt any answers and experts were allowed to indicate multiple choices. How do these sites cater for ETM learning?

The Most Popular Sustainability Website

The most popular sustainability website is that of the World Business Council for Sustainable Development (WBCSD, 2005). A keyword search for “environmental technology management” returned no results. “Environmental technology” however returned 22 entries and “environmental management” generated 167 results, indicating that the two areas are still perceived as unrelated. As expected, the cross cutting theme of innovation/technology claims that technology is a key tool for a sustainable future and that business clearly needs to play a stellar role in meeting this challenge. The news, case studies, publications and presentations are information resources with limited use as they are targeted mainly as a public relations exercise without helping those who are looking for real solutions (eg what a database of environmental solutions could provide) or those who still have not been converted or are recent converts to the sustainability concept. Nevertheless, the popularity of this website seems to have grown by a significant 12% since a similar survey in 2003 (see Figure 1).

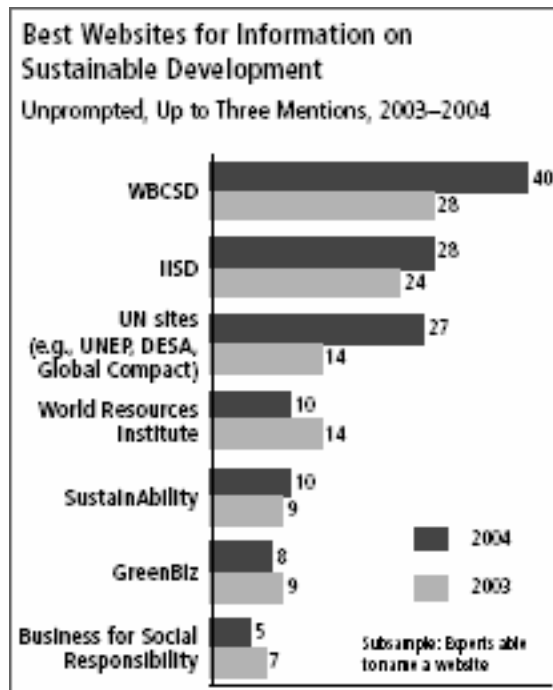


Figure 1. Best websites survey results (WBCSD, 2005)

The site of the WBCSD does have an animated learning tool called “An Interactive Sustainable Development Learning Map” which claims to present a graphical description (cutting down on words) of “the critical links between the natural, the economic and the social dimensions of our world”. The goal of the learning tool is to present a holistic picture of the complex and interrelated layers of reality and help the learner understand “how humanity is hooked on growth, how values or social tensions drive technology/innovation, how production not only creates environmental degradation but also the social capacity for solutions...” The learner immediately gets a clear picture of the intricacies in the topic as well as a sense of intrigue to continue to push the button. The presentation of the sustainability concepts is organised at six levels (or stages) which add new dimensions to the basic issues of population (financial security standard of living, employment and unemployment, desire for more growth), consumption (surplus wealth), production, material input and capital investment. These lead to environmental degradation which can be addressed through the “life saving devices” of eco-efficiency and mitigation investment. A level higher, the power of creative knowledge offers new approaches to solutions ranging from education, which delivers technology and innovation, to the development of social capital and redistribution. The final outcomes are new values and awareness for the need of systemic change that leads to new allocation of investments and institutional improvements.

Aside from the criticism for the choice of graphic symbols (everything is presented by fish) and the difficulty to read the colour/size text combination, from a pedagogical point of view the learning tool as well as the website itself satisfies only the condition to present the learning resources. There are no learning tasks or learning support provided. Also, there is no proactive encouragement for the learning process to happen.

As the same Glodescan survey also predicts that the WBCSD will be one of the most influential international institutions in terms of advancing sustainable development in the next 5 years, only behind the European Union (Chennell, 2005), its educational role leaves ample space for improvement.

User Oriented Website

The website of the International Institute for Sustainable Development (IISD, 2005) has a sustained and increasing popularity (up by 4% since 2003). From an educational focus the 'learner' is replaced by the 'user' and the goal is to engage with the information and to be able to critically use it. The website has a lot to offer, in relation to electronic resources. However, pedagogies and delivery strategies are not clearly identified or transparent. The Institute states its vision as a "better living for all – sustainably" and its mission as to "champion innovation, enabling society to live sustainably". The website includes a lot of innovative ideas but does not take them to a level of facilitating the learning process. From the perspective of the learning environment provided by the web-based technology, there are few concerns about its effectiveness.

The IISD delivers only one side of the Oliver's triangle (Oliver, 1999), namely the learning resources. The quality of the website, therefore is determined by the richness of the information, the authenticity, the updated nature of it and the relevancy to the user. It is also very important for the web site to allow the learner to engage with the material in a meaningful way. The IISD's website contains functions such as Calendar, Media room, Employment, Funders and Contact which help to organise and provide the virtual community with functional services, upon which the users can participate in making decision and choices such as conference participation, view employment opportunities etc.

The Institute is clearly interdisciplinary and brings together knowledge from business, climate change, communities & livelihoods, economic policy, energy, investment, knowledge network, leadership development, measurement & assessment, natural resources security and trade. For each topic an easy to navigate web page contains description, information and web links to extend the topics to other relevant sites. It is comprehensive and enables to download PDF files on a variety of topics. It also covers current features and links to the latest news and research from IISD and other up-to-date international events (for example developments from "Integrating economic and social policies to achieve the United Nations developmental agenda" forum held March 14-15, 2005, at the United Nations headquarters in New York). The website also provides access to electronic commentary, publications, internship research library and more that can be used by scholars, naive users or students in cross disciplinary areas. The research tools offer database and catalogues facilities such as "links to libraries with sustainable development focus that have online searchable database."

The use of index page enables easy navigation to all the areas of the web site. It uses hyper links to provide ready access to related information quickly and effectively, (ie the link to another excited environmental education site such as PEMBINA institute). It includes navigation markers and links within the page, graphics to improve the look and feel of the page and colour images where necessary. There is clear layout, different section with titles, organizational cues to aid orientation and scooping, but there is no variety of media format such as video, audio or animation. Only text is being used.

Although the knowledge network is extensive, and provides good digital repository, the part that is missing is interactivity with the user. A simulation on the different topics can provide the user with a sense of interactivity, which can increase the quality of learning in using the electronic resources. The virtual experience can stay in the level of information exchange or can be taken to a higher level of knowledge construction by building in interactivity or simulation, which will require additional input from the user.

The keyword search for "ETM" did not return any results, with "environmental technology" returning 9 and "environmental management" 55 entries. It is clear that ETM is still an emerging area of professional education and research but the extensive website suggests that there is a growing interest in the sustainability area. However, the main question still remains: whether the resources promote the awareness for and facilitation of sustainable technologies and how the learning tasks and the learning support can be incorporated to increase the learning opportunities.

The Most E-Learning Supportive Website

The website we found to be most supportive of e-learning is that of GreenBiz (2005), which is a non-profit, non-partisan company aspiring to use "the power of technology to bring environmental information, resources, and tools to the mainstream business community". The provision of learning opportunities is part of the company's mission together with

access to clear and accurate information and resources helping to integrate environmental responsibility with profitable business practices. The amount of information and advice is impressive, but most importantly the website represents a very efficient e-learning environment through the Business Toolbox. It targets the private sector as well as NGOs and government organizations. It is extremely well designed and a keyword search on “ETM” generated one entry (the University of Arizona Masters as described above), “environmental technology” returned 264 matches and “environmental management” 700.

The GreenBiz’s Business Toolbox covers a wide range of topics, namely best practices, climate change, compliance, corporate reporting, environmental management systems, energy efficiency, green building, green careers, green design, green printing, green purchasing, partnerships, pollution prevention, renewable energy, small business, supply chain, sustainable development, waste reduction and water conservation. There are no learning tasks but the materials are organised in a way that is extremely useful and easy to use for anybody who is looking for making a change in the way their business is conducted. There are GreenBiz essentials, how-to, reports and tools. The tools, for example are a collection of resources that allow a company to assess itself in terms of environmental impact or to locate useful software. There are also links to bookstore, available jobs and reference collection. Although there is not a direct learning support for the website, the Reference option provides information on the Mentor Centre which is a link to hundreds of organizations offering free or low-cost assistance to help companies address sustainability issues, “from regulatory compliance to cutting-edge initiatives”. Overall, although this website was valued only by 8% of the experts surveyed by Globscan, it ranks very high in terms of its impact and potential for e-learning in relation to environmental technology management and sustainability.

Sustainable Technologies Websites

In addition to the websites cited in the Globscan survey, there is also a wide range of sustainable technologies websites which are organised around particular technologies, eg solar medical equipment and solar hospitals, or issues, eg eliminating hunger or disaster help. They contribute to the technical learning of the sustainability practitioners but tend to service a particular purpose rather than provide a holistic approach. We are certain that they make a significant contribution to e-learning in their respective fields and we leave it to the readers to assess their specific features.

Conclusion

The sustainability agenda is not an issue that is likely to go away and the new approaches to the way we live and do business need to be learned. This emerging field of formal education needs the strong support of the Internet community and the power of online learning to deliver a broad band of knowledge, interactivity (Maor, 2003), creativity and connectivity. The quality of the website, therefore is determined by the richness of the information, the authenticity, the updated nature of it and the relevancy to the user. Although not designed specifically for the purposes of e-learning, all examined websites pass these assessment criteria and are truly valuable resources for ETM and sustainability practitioners.

For an effective learning, however, it is also very important for the websites to allow the learner to engage with the material in a meaningful way and not to be drawn in the sea of information. This is what these websites fail to achieve. Therefore learning support and learning tasks should be an integral part of the website’s design in order to create real impact and change perceptions and practices. Most websites are yet to make this contribution. Being the most frequently used websites in the area of sustainability, there is a need for explicitly learner-oriented aspects in them. The framework suggested in this paper could be used in the design of websites encouraging on-line learning in this area, as it will allow integration of learning with relevant and appropriate content and satisfy a number of pedagogical requirements.

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