Sustainable education: Principles and practices

Dr Peter Reynolds
Department of Education, Western Australia and
Dr Rob Cavanagh
Curtin University of Technology, Perth, Western Australia

Paper submitted to the 2009 Annual Conference of the Australian Association for Research in Education: Canberra.

Abstract
This paper is theoretical and presents a synthesis of research and literature on sustainable education. The notion of sustainable education as used in this critique is about educational organisations and should not be confused with education for sustainability which can be viewed as concerning the teaching and learning of sustainability.

Sustainability often refers to persistence, sustenance or endurance. It can also refer to preservation of environments, facilities or cultures. And often is connected with development, for example the notion of sustainable development. Notwithstanding these multiple meanings, it is generally recognised that sustainability endeavours involve social, economic, and ecological considerations. Also these three forces are inter-related and inter-dependent.

When economic sustainability, social sustainability and environmental sustainability are being examined from a sustainable development perspective, it is typical for indicators to be specified. For example, economic indicators that measure monetary flow when assessing organisational sustainability. While the types of indicators vary according to the aspect of sustainability being assesses (i.e. economic, social, or environmental), these are also dependent on the object of the assessment. For example, the indicators for social sustainability applicable to a corporate organisation will be different to those for a local community organisation (e.g. city council). From this traditional orientation, the paper examines examples of indicators for different types of sustainability for different contexts.

Some alternative ways of understanding sustainability are examined. For example, types of capital (e.g. human capital, social capital and constructed capital), the construct of ‘carrying capacity’, systems approaches, and sustainable development as a process of learning.

Educational sustainability is then approached through understanding sustainability quotients. These quotients which can be applied to many forms of sustainability, are about the balance between what is consumed in relation to what is available. Significantly, because social capital can be created, social sustainability concerns production of human, social and constructed capital. This can be contrasted with ecological sustainability centring on the impact on finite natural capital. Educational organisations that improve the knowledge and skills of learners have the potential to profoundly affect social sustainability with consequent impacts on ecological and economic sustainability.

The paper concludes with a series of propositions about researching educational sustainability. These are structured around epistemological, methodological, and organisational dimensions.
Address correspondence to:
Associate Professor Rob Cavanagh,
School of Education,
Curtin University of Technology
GPO Box U1987
Western Australia 6845
Email: R.Cavanagh@curtin.edu.au
Phone: +61 8 9266 2162
Fax: +61 8 9266 2547

The research was conducted as part of an Australian Research Council funded Linkage Project between Curtin University of Technology and the Participation Directorate of the Western Australian Department of Education and Training.
Sustainable education: Principles and practices

Introduction
The purpose of this examination of sustainability and education is to identify salient constructs and how these apply to educational organisations. It commences with an overview of the process of sustainability. This is followed by explication of indicators used to measure economic, social and ecological sustainability forces in organisations, communities, and institutions. These are then reframed using alternative conceptions of sustainability such as anthro-capital, systems theory, and learning theory. The sustainability quotient approach is then used to view sustainable education. Finally, some of the issues involved in researching educational sustainability are examined from epistemological, methodological and organisational perspectives.

Sustainability
The concept of sustainability has proven difficult to define. However, one commonly accepted dimension of definitions is related to time. “Sustainability encompasses an inherent goal of being able to persist, sustain, and endure” (Stephens, Hernandez, Roman, Graham, and Scholz, 2008, p. 319). Another dimension with widespread acceptance concerns preservation. “Sustainability is often seen as being about protection of amenities (including cultural diversity)” (Kemp, Parto, and Gibson, 2005, p. 14). Sustainability is also typically connected with development. For example, the World Commission on Environment and Development (1987) defined sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Munier (2005) noted that development which is sustainable requires advancement in economic growth, social progress and environmental protection. These three areas are also used when classifying global problems. Schmuck and Schultz (2002) expressed concern that without a balance between economic sustainability, social sustainability and environmental sustainability, a society cannot continue indefinitely. Combinations of economic, social and environmental forces or vectors are also portrayed in illustrations of sustainable development (Mawhinney, 2002). These have been traditionally been viewed as the ‘pillars’ of sustainable development, inter-acting variables that influence sustainable development, or overlapping circles in which the area of over-lap represents sustainability (Mawhinney, 2002). While these portrayals have been criticised for being over-simplistic, the pursuit of sustainability certainly requires integration of social, economic, and ecological considerations (Kemp, Parto, and Gibson, 2005).

The following sections examine these three considerations as they can be applied to organisations, communities or institutions. The difference between organisations and institutions arbitrarily centres on the distinction between corporate or privately funded enterprises and government funded and/or operated agencies. Specific examples of the indicators used to assess and report on sustainability are provided.

Economic sustainability indicators
The Global Reporting Initiative (GRI, 2002) specifies guidelines for measuring organisational sustainability. The economic indicators or impacts are intended to measure the monetary flow between the organisation and its key stakeholders, and to indicate how the organisation affects the economic circumstances of stakeholders including customers, suppliers, employees, providers of capital, and the public sector (GRI, 2002).
The sustainability indicators for Norwich City (Norfolk, UK) include economic indicators. For example, the employment rate, national training and education targets, increases in jobs, and tourism revenue (Bell and Morse, 1999).

The Norwegian Agency for Development Cooperation (NORAD, 2000) specifies indicators for assessing economic aspects of institutional sustainability. First, available resources are sufficient to cover major recurrent and capital expenditures - the budget is large enough to allow the institution to fulfil its obligations, and the institution’s income will most likely remain stable. Second, the institution is able to control/ influence its future income, the institution is financially self-sustainable and does not depend on external financial support, and outside agencies or authorities control or supervise economic expenditure (NORAD, 2000).

Social sustainability indicators
The Global Reporting Initiative (GRI, 2002) identified organisational social sustainability impacts. The GRI Guidelines specify four areas of impact: labour practices and decent work (e.g. employment, labour/management relations, and training and education); human rights (e.g. non-discrimination, freedom of association and collective bargaining, and indigenous rights); society/community (e.g. bribery and corruption, political contributions, and competition and pricing); and product responsibility (e.g. customer health and safety, advertising, and respect for privacy).

Communities with social sustainability “… provide a good quality of life, with a focus on acting in the best interests of present and future members” (Hammond and Churchman, 2008, p. 236). For example, the social sustainability indicators for an urban development project in Hong Kong reflect this principle – they include provision of social infrastructure, job opportunities, accessibility, fulfilling psychological needs, and preservation of local characteristics (Chan and Lee, 2008). When developing a model of social sustainability, Baron and Gauntlett (2002, p. 4) identified five principles of social sustainability:

• “Equity - the community provides equitable opportunities and outcomes for all its members, particularly the poorest and most vulnerable members. While equity is listed as a separate principle, it is such a fundamental component that it is really an artificial separation. Equity in fact operates like a filter through which all other principles are viewed;
• Diversity - the community promotes and encourages diversity;
• Quality of life - the community ensures that basic needs are met and fosters a good quality of life for all members at the individual, group and community level;
• Interconnectedness - the community provides processes, systems and structures that promote connectedness within and outside the community at the formal, informal and institutional level; and
• Democracy and governance - the community provides democratic processes and open and accountable governance structures”.

From an institutional perspective, the NORAD (2002) indicators pertaining to social sustainability of institutions centre on two areas. First, community rules and norms - informal rules and norms surrounding the institution are conducive for its performance, there are no ethnic conflicts affecting the institution, and there is no gender discrimination affecting the institution. Second rules and norms in official agencies - formal rules and norms prevailing in the bureaucratic structures surrounding and permeating the institution are conducive to its
performance, and no practices and attitudes, such as corruption and lack of discipline, pose a threat to the institution’s efficiency.

**Ecological sustainability indicators**

Shrivastava (1995) identified four mechanisms through which companies can contribute to ecological sustainability - total quality environmental management, ecologically sustainable competitive strategies, technology transfer (technology-for-nature swaps), and corporate population impact control. The GRI (2002) environmental impact indicators show aspects of the physical and biological environments that can be affected by an organisation - materials, energy, water, biodiversity, emissions, effluents, and waste, suppliers, products and services, compliance, and transport.

The ecological priorities of a community are illustrated by the Norwich City environmental protection sustainability indicators. These assign value to clean air, less domestic waste, saving water, saving energy, clean river water, more wildlife, protecting open spaces, clean streets, and less traffic.

The indicators of ecological sustainability applicable to an institution or development project are often a consequence of the setting of goals and assessing the achievement these goals (Bell and Morse, 1999). This limits the range of indicators that are applied and reported. Also, assessing the sustainability of projects that have a short life span or limited goals is often restricted to economic effects (e.g. financial self-sufficiency) to the neglect of other effects (Bell and Morse, 1999). If ecological objectives are not overtly incorporated in the goals, the consequence of these limitations can be less attention to ecological sustainability. A more fundamental problem is the gauging of sustainability becoming part of project appraisal processes. Bell and Morse (1999) were critical of this practice for three reasons: use of ‘off the shelf’ appraisal techniques; staff conducting the appraisal not necessarily trained in sustainability; and pressure for appraisals to be completed quickly.

**Alternative conceptions**

The preceding discussion was organised around three ‘sustainability forces’ and used specific sustainability indicators to show how sustainability can be assessed and measured in corporate organisations, institutions and communities. However, treating economic, social and ecological considerations separately and differentiating between organisations, institutions and communities does not accurately reflect the realities of sustainability and sustainable development. Some alternative conceptions are presented below.

McElroy, Jorna and van Engelen (2008) emphasised the importance of ‘anthro-capital’. This is non-financial capital including human capital, social capital and constructed capital. They viewed sustainability of organisational operations “… in terms of whether or not they result in the preservation and/or production of sufficient levels of human, social and constructed capital” (McElroy, Jorna and van Engelen , 2008, p. 228). Also, “…unlike ecological capital, which humans do not create and which is found in fixed, limited supplies, anthro-capital is anthropogenic; it is created by humans in whatever amounts we like in order to meet our needs” (McElroy, Jorna and van Engelen , 2008, p. 231). Thus ecological capital is finite and must be carefully allocated whereas in the case of anthro-capital, consumption patterns are more flexible since non-fixed resources are being consumed. An associated construct is a variation on ‘carrying capacity’, “… the environment’s ability and potential to indefinitely sustain the use of a renewable resource” (Munier, 2007, p. 207). This notion is applicable to
social and economic systems in which sustainability comes from resilience and not exceeding a threshold of consumption beyond which the resource will no longer be available.

Mawhinney (2002), suggested that understanding the concept of sustainable development can be simplified by commencing at the level of principles (e.g. social improvement, environmental concern, or futurity). And then after referring to economic, social and environmental elements and deciding on the currency of measurement, selecting indicators. He identified three ‘principled’ options for evaluating sustainable development in conjunction with data collection methods: involving stakeholders in decisions about equity, participation and futurity; using checklists as a base cross reference for ensuring social, environmental and economic balance; and cross reference to other ‘local’ relevant documents (Mawhinney, 2002).

Systems theory is frequently used to understand, assess and manage sustainability (Bell and Morse, 1999 & 2003; Clayton and Radcliffe, 1996). “A systems approach to sustainability entails considering the various agents interacting in the world as systems” (Clayton and Radcliffe, 1996, p. 12). The particular systems are typically ‘open’ since there is an exchange of energy and resources with the environment. Apart from these systems being part of larger systems, internally they are comprised of interactive elements in a state of dynamic equilibrium. Developing models of the elements and their interaction provides useful information for decision-making that has to deal with the inevitable trade-offs between sustainability objectives.

Sustainable development has been described as a process of learning (Bell and Morse, 2003). The power of this conception for sustainability planning and indicator specification lies in an initial focus on epistemological understandings. That is, a process of learning about knowledge and knowledge construction. This is followed by stakeholders learning about their own needs and understandings as well as those of others. These activities comprise the preliminary phases in a learning cycle model of sustainable development. Bell and Morse, (2003, p. 157) conclude that application of a learning cycle provides an opportunity for “… a merging of the bottom-up community with the ‘expert’ visions in a systemic learning for sustainability”. A more general view of learning and sustainable development concerns the role of education and training, particularly personal development training. Developing social and environmental awareness in business and industrial sectors is an educative process (Clayton and Radcliffe, 1996).

The sustainability quotient approach and educational sustainability

The following examination utilises McElroy, Jorna, and van Engelen’s (2008) application of Faber, Jorna and van Engelen’s (2005) explanation of sustainability theories or perspectives on sustainability. McElroy, Jorna, and van Engelen (2008, p. 225) noted that these can be “… described in terms of three aspects or attributes: (1) sustainability always has a referent (or artefact), (2) it has a goal orientation and (3) it entails a type of relation with an environment”.

With regard to the referent or artefact, McElroy, Jorna, and van Engelen (2008, p. 225) differentiated between ‘entities and ‘constructs’. For example, “A manufactured product, such as an automobile, would be a case of an entity, whereas a process or activity would be a construct”. The artefacts in educational systems, schools and programs that are of a concrete nature such as physical infrastructure, equipment, and teaching resources would be classified as ‘entities’. Artefacts about processes or activities that are more abstract would be classified as ‘constructs’ - for example, systemic priorities, school development plans, the curriculum,
classroom instructional programs, remediation strategies, and individual education plans for students with special needs. In the case of business corporations, McElroy, Jorna, and van Engelen (2008, p. 225) observed that corporate sustainability management (CSM) reporting is typically focused on ‘the sustainability of organisational activities’ that are ‘construct’ artefacts. Alternatively, the artefacts requiring consideration in educational enterprises comprise both ‘entities’ and ‘constructs’ with instructional processes and student learning (‘construct’ artefacts) being particularly important.

Goal orientation refers to the distinction between an ‘absolute’ view (i.e. an artefact is either sustainable or unsustainable) and a ‘relative’ view (artefacts can have degrees of sustainability). For educational organisations, both views of goal orientation are identifiable - there are ‘big-picture’ designs and also improvement plans based on small incremental steps. In contrast, the ‘relative’ orientation is most commonly applied in CSM (McElroy, Jorna, and van Engelen, 2008).

Behavioural interaction concerns the “… dynamics of the interplay between the artefact and the social and/or ecological environment” (McElroy, Jorna, and van Engelen, 2008, p. 225). There are two forms of interaction - the equilibrium between the organisation and the environment is maintained by either the artefact responding to a static environment; or, the artefact is responsive to a changing environment. Educational organisations are open systems and one of the environments with which they interact is the external social environment. Given the dynamic nature of the social environment, the artefacts in educational organisations are responding to a changing environment. In the case of CSM, the environment is usually considered static hence corporate sustainability management reporting tends to be ‘context free’ (McElroy, Jorna, and van Engelen, 2008).

Sustainability quotients express the relation between “… the rate of capital resource consumption and/or production [impact] by an organisation with the corresponding rate of capital resource supply, or need, proportionately allocated to the organisation in some way [entitlements]” (McElroy, Jorna, and van Engelen, 2008, p. 228). The entitlements are similar to ‘carrying capacity’. In the case of the ecological sustainability this concerns natural/ecological capital and in the case of social sustainability concerns anthropo-capital. An ecological sustainability quotient > 1.0 indicates a lack of sustainability since the impact on the environment exceeds the available share of natural capital. A social sustainability quotient of >1.0 indicates sustainability since the net rate of anthropo-capital produced (the impact) exceeds the share of anthropo-capital carrying capacity the organisation is required to produce. In this way, social sustainability concerns the production of human, social and constructed capital whereas ecological sustainability concerns impact on natural capital. The challenges in estimating a social sustainability quotient are: deciding upon the types of impact that require assessment; making a normative judgement about the amount or proportion of anthropo-capital required or expected of the organisation; and then, measuring the actual contribution of the organisation.

**Researching educational sustainability**

It is proposed that studying and researching the sustainability of an educational system, a school district, a school, or a particular educational program will be a multi-dimensional exercise. Attention will need to be given to epistemological, methodological and organisation matters.

An epistemological dimension.
• Conceptualising sustainability as a change paradigm - sustainability is a process not an outcome.
• Deciding upon the relation between economic sustainability, social sustainability, and environmental sustainability for the social institution of education - e.g. interlocking spheres model, concentric circles model, or pillars model.
• Applying theoretical constructs to the field of education and the operations of schools - e.g. identifying artefacts and goal orientations, specifying normative propositions, setting standards for performance, and agreeing on obligations to community and society.
• Understanding the relation between anthro-capital production and expectations of anthro-capital consumption - educating children and adults produces anthro-capital; improving the lives of disadvantaged persons increases anthro-capital.
• Dealing with economic, social and environmental types of sustainability - a multiple ‘footprint’ approach - e.g. the ecological footprint model (Wackernagel and Rees, 1996), the social footprint approach (McElroy, Jorna, and van Engelen, 2008), and a model to examine economic impact and provision.

A methodological dimension.
• Specifying the units of investigation - systems, districts, or schools.
• Identifying and recruiting stakeholders – groups or individuals.
• Developing protocols and procedures for inclusive and participatory stakeholder involvement including feedback and review of interpretation loops - resolving the epistemological issues listed above.
• Training and educating the stakeholders in sustainability theory and practice.
• Development of multiple instruments for data collection based on the epistemological issues presented above - focus group interview schedules, survey instruments, or data mining tools.
• Developing inclusive methods of data analysis and results triangulation - training stakeholders in qualitative and quantitative data analysis methods.

An organisational dimension.
• Gauging the importance of sustainability principles within the organisation.
• Identifying policies and procedures that could inform judgements about sustainability.
• Locating data relevant to sustainability indicators.
• Assessing the use of current documentation and data for sustainability analyses.
• Identifying gaps in data.
• Mapping prevailing program evaluation mechanisms against sustainability analysis and reporting processes.

Conclusion
Framing the goals and operations of educational organisations in terms of sustainability constructs is highly important.

Economic, social and ecological sustainability is a global imperative and local groups and organisations have a role to play in this process. The responsibility of education as a social
institution necessitates that educational organisations make a meaningful contribution to ensuring sustainability at local, societal and international levels. This is additional to enabling teaching and learning about sustainable development (Decade of Education for Sustainable Development, UNESCO, 2002).

The paradigm of sustainability provides a holistic perspective on development requiring consideration of economic, social and ecological forces. Applying this paradigm provides a comprehensive view of multiple aspects of the organisation.

Sustainability is a change-oriented process and the press for sustainability will inevitably necessitate shifts in how the organisation is understood by stakeholders and how it operates. Sustainability increases learning within the organisation leading to cultural change.

Assessing sustainability requires specification of indicators, collection of data, and analysis of data - an evaluative process. Estimation of measures such as sustainability quotients generates formative and summative assessments that can be used for other organisational functions such as accountability reporting.

In conclusion, while there is little doubt that educational organisations will need to develop and respond to press for change, continued development requires economic, social and ecological sustainability.

References
Barron, L., and Gauntlett, E. (2002), Housing and Sustainable Communities Indicators Project. Perth, Western Australia: Western Australian Council of Social Service Organisations.


