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3. HOW TO TEACH EDUCATION FOR SUSTAINABILITY

Integrating Theory and Practice

I touch the future. I teach.

(Christa McAuliffe, cited in Nick Green, 2014)

The title of this chapter may appear a little daunting to many teaching practitioners. However, if we view theory as being about significant educational principles for informing effective teaching practice, then it is important to include in this book some theory related to the teaching and learning of education for sustainability (EfS). In this chapter, I briefly outline the role of EfS before explaining how ideas about teaching and learning have changed in relatively recent times. I also highlight how the EfS literature, policy documents and guidelines have become more inclusive of action competence and a futures-oriented approach (Australian Government Department of Environment, Water, Heritage and the Arts [AGDEWHA], 2010; New Zealand Ministry of Education, 2010). I then illustrate how effective teaching in EfS can be guided by Jensen's model of *action competence* (Jensen, 2002), especially in terms of engaging primary school students directly in sustainability issues, with the intention of enabling them to realise their visions for a sustainable future.

THE ROLE OF EDUCATION FOR SUSTAINABILITY

UNESCO has bestowed on education, both formal and informal, a significant role and responsibility in the area of sustainable development. UNESCO sees the task of education as facilitating worldwide the infusion into school and life in general, attitudes, values, practices and behaviours that align with sustainable development. The recent United Nations Decade of Education for Sustainable Development (DESD 2005–2014) was directed toward using education as a means of instilling in individuals the following: respect for dignity and economic justice for all, respect for the human rights of future generations, and acceptance that the economy occurs within the bounds set by ecology and not the other way around (UNESCO, 2006, pp. 15–16).

Historically, environmental education (EE) began with a focus on maintaining and improving the natural environment. However, EfS has since been conceptualised in a broader manner to include, in addition to considerations relating to the natural environment, the wellbeing of society and economic issues (Jenkins & Jenkins, 2005). According to UNESCO (2006, p. 4), education can generate a "positive societal transformation … [that produces] behaviours and practices which will enable all to live a full life without being deprived of the basics". The Belgrade Charter (UNESCO-UNEP, 1975), ratified as early as 1975 by numerous nations, set the global framework for EE, especially in terms of linking

environmental preservation with socially just development. The latter integrates the three "pillars" of sustainability—society, environment and economy (UNESCO, 2006, p. 14). The critical need for EfS was further emphasised by the United Nations' Agenda 21, established at the Earth Summit held in 1992. It became a blueprint for action to achieve a more sustainable world (United Nations Sustainable Development Division, 1992). Agenda 21 charged all levels of education, in both the formal and informal sectors, with responsibility for the "critical" process whereby societies and individuals can reach their "full potential", thus "building capacity" to appropriately attend to environment and development issues (United Nations Sustainable Development Division, 1992).

International and national organisations, as well as national policy and guideline documents concerned with EfS, have articulated the importance of promoting a futures orientation in this form of education (AGDEWHA, 2010; Earth Charter International, 2000; New Zealand Ministry of Education, 1999; UNESCO, 2006). Indeed, the preamble of the text for the *Earth Charter*, a document that outlines the values that humanity must embrace in order to achieve the goal of a fair, sustainable and peaceful world, illustrates the significance of facilitating such "foresight":

> We stand at a critical moment in Earth's history, a time when humanity must choose its future. As the world becomes increasingly interdependent and fragile, the future at once holds great peril and great promise. To move forward we must recognize that in the midst of a magnificent diversity of cultures and life forms we are one human family and one Earth community with a common destiny. We must join together to bring forth a sustainable global society founded on respect for nature, universal human rights, economic justice, and a culture of peace. Towards this end, it is imperative that we, the peoples of Earth, declare our responsibility to one another, to the greater community of life, and to future generations. (Earth Charter International, 2000, preamble)

Education for sustainability emphasises the significance of contributing to the creation of a preferred sustainable future by explicitly visualising it in teaching and learning, as well as recognising that the future is something that humans fashion as a direct result of their present values, attitudes and actions (UNESCO, 2002, pp. 20–21). Similarly, the Australian Sustainability Curriculum Framework, which provides guidelines for curriculum and policy developers, emphasises the need for EfS to be both "present and future-oriented" in full knowledge that any actions carried out in the present will influence what occurs in the future (AGDEWHA, 2010, p. 4).

In order to generate a sustainable future, EfS can aid members of a society to produce an appropriate and informed balance, within their particular context, between the pillars of sustainability. For example, if too much emphasis is placed on economic growth, the quality of human life and urban and natural environments could be threatened (Jenkins & Jenkins, 2005). This outcome might manifest itself through various forms of pollution, resource depletion, increased inequity and injustice, poverty, land disputes, disease and even conflict. Effective EfS informs individuals and societies about how they can reach a suitable balance between economic development and environmental sustainability.

An example of too much emphasis on economic development leading to environmental degradation, conflict, social disintegration and loss of life occurred in Bougainville, an island that is part of Papua New Guinea. Economic interests initially took precedence when land

was taken from local Bougainvilleans so that it could be mined for copper. These developments changed land relations and allowed multinational mining interests and the New Guinean government to profit disproportionately, to the detriment of many of the locals. Ensuing unsustainable mining operations produced river pollution, destruction of local wildlife, loss of livelihood (fishing), sickness and death. The local landowners' initial resistance and the consequent retaliation by the New Guinean forces led to a 12-year conflict that ultimately resulted in the death of approximately 10,000 people and the traumatisation of thousands more. The Bougainville experience illustrates how exploitation of the environment for profit can disrupt the balance between the pillars of sustainability and ultimately result in significant conflict in certain situations (Jenkins & Jenkins, 2005).

Some of us might view this example as an extreme one. However, the future is likely to witness many similar scenarios if we continue to over-exploit the Earth and deplete resources such as the water, soil and air on which we all depend. In this early part of the chapter, I have highlighted the need for effective EfS that can raise individuals' awareness of these issues, help them reduce their impact on the environment, and thereby enable them to contribute to a more sustainable future. However, instilling understanding and actions conducive to balancing the pillars of EfS also relies on effective teaching and learning practices that facilitate students' creative decision-making and problem-solving skills. A useful way of discussing what constitutes effective EfS in this context is to explore theory and practice in education more generally, and the relationship between these two components in EfS in particular. Accordingly, in the remainder of this chapter, I look at some of the theory behind effective learning and teaching practices and how we can link this theory to EfS.

EFFECTIVE LEARNING AND TEACHING

Traditionally, students were perceived as "empty vessels" passively waiting for teachers to fill them with knowledge. This approach to teaching, known as the *transmission model*, is characterised by a very teacher-centred approach to education. The teacher is viewed as the "expert" who generally imparts knowledge from the front of the classroom using a "chalk and talk" method. Students sit in rows facing the front of the room, where the teacher is dominant. Such teachers often develop lessons by writing notes on the board that summarise what they have already articulated to the class. Students have little input except to answer the teacher's questions, for which the teacher usually already has prescribed answers. The transmission model consequently allows minimal opportunity for students to discuss their ideas with their peers, and there is little room for creative thinking and problem solving.

This teacher-centred method used to be the norm. However, educational research has since made clear that students are not empty vessels but come to the classroom with their own ideas about the world around them. Also, rather than being passive recipients of knowledge, they actively construct their knowledge based on their own experiences. This research led to the development of *constructivist theory* and the *constructivist movement*, which took a radically different theoretical view of teaching and learning to that of the *transmission model.*

Early constructivists, such as Piaget, Vygotsky and Bruner, believed that learning implies an *active, student-centred* process in which teachers take an interest in their students' ideas. These authors brought somewhat different emphases to their theorising. For example, Piaget

(Flavell, 1963) emphasised cognitive development of individuals in interaction with their environment, while Vygotsky and Bruner focused on construction of knowledge within a social context via interpersonal interaction. That said, all shared the belief that students are *actively* involved in constructing meaning.

Bruner (1996) advocated that "Learning should be participatory, proactive, communal, collaborative, and given over to the construction of meanings" (p. 84). When students actively participate in learning, they tend to construct new or modified views of the world. They can begin to question their pre-existing ideas if they discover, through different learning experiences, that these new experiences challenge their current thinking. Learning becomes a means of reconciling the conflict between the original views of the students and what they now conceive as "reality" in light of new experience (Festinger, 1957). In this context, rather than conveying knowledge, the teacher facilitates students' constructions of new understandings about the world.

Learning from and with one another is also extremely important, as Vygotsky (1978), a *social* constructivist, pointed out. He highlighted the social and cultural nature of cognition (thinking), whether it develops through interaction with parents, siblings, peers or teachers. Once children and young people begin working and exploring ideas together, their learning can become far more powerful and effective. This outcome is especially true when teachers deploy the essential characteristics of cooperative learning, such as individual accountability (everyone has a job to do) and positive interdependence (everyone must work together to create a group product and for the group to succeed) (Johnson & Johnson, 1987; Kagan, 1992). Student perspectives are broadened and numerous ideas engendered, thus extending students' potential to learn more with their peers than on their own.

Having briefly examined some of the theory that has led to an emphasis on active, student-centred learning, I now go on to relate this specifically to EfS.

LINKING EDUCATION FOR SUSTAINABILITY TO TEACHING AND LEARNING THEORY

Ideas about what EfS is and how to teach it are diverse. However, Huckle and Sterling (1996) identified a "recurrent theme" within this diversity, namely that EfS is "process-driven, participatory and empowering, is liberatory and continuous" (1996, p. *xiv*). This definition implies that, to be effective, EfS needs to draw on constructivist theory and actively engage students in learning about sustainability issues, generally through use of cooperative or collaborative strategies. It also indicates that EfS needs to leave behind the passive transmission model of education in favour of the more transformational constructivist model.

We can define EfS as transformative because it aims to change unsustainable social and individual practices to sustainable ones, as well as the structures that maintain these practices (Kemmis & Mutton, 2012, p. 192). Thomas (2009, p. 245) states that for appropriate sustainable change to occur, pedagogy must focus on "how to learn" rather than on knowledge accumulation. Thomas notes that one of the commonalities between EfS and transformative education is "critical thinking". Students can be taught to avoid passive acceptance of received views and to critically reflect on preconceived, unchallenged notions, and this can effect change. This model of EfS sees the teacher as a facilitator of learning, and

it affords opportunity to critically examine possibilities for change, which is sorely needed given the current unsustainable patterns of living in most countries of the world.

One particularly effective approach to directly engaging students in sustainability issues is Jensen's (2002) model of *action competence*. This action-oriented approach requires students to engage actively with sustainability issues in a multidimensional manner involving four facets of knowledge. Although Jensen's model features environmental issues, it can be readily adapted to the broader area of EfS, as shown in Figure 3.1. As the figure shows, an EfS issue is explored in light of its "symptoms" (effects), its "root causes" and any "preferred futures" (visions) that students can generate about what a sustainable future could look like in light of this particular issue. It also brings to the fore any "change strategies" (actions) likely to facilitate such an appropriate vision.

It is important to note that "futurising"—imagining and exploring alternative futures in order to choose a preferred future (Bateman & Smith, 2004; Slaughter, 1996)—is of benefit to numerous disciplines. However, it is EfS where this attracts specific mention (Hicks, 2008, p. 78). Commentators have argued that the futures orientation has been missing from environmental education (Hicks & Holden, 1995). They claim that in order to bring about a desired sustainable future, we need to create complementary visions and subsequent actions in the present. It makes sense that what we do/think and imagine today will shape our futures!

Jensen (2002) stresses the need for the educational process within the action competence model to be student-centred and democratic. As an example of this approach, students from Paracombe primary school in Australia instituted a Great Environmental Makeover at their school. They decided to focus on the problem of drought, and through a very participatory, democratic, student-led process researched, planned, implemented and documented the establishment of a drought-resistant native garden. Many other Australian and New Zealand schools are engaged in similar initiatives. The Paracombe example demonstrates that "change strategies and actions" developed and chosen by students can bring about an appropriate transformation in keeping with their desired sustainable future. In order to become active agents of change, students had first to utilise their critical and creative thinking skills in order to imagine alternative and preferable visions of what the school grounds could be and then generate appropriate actions to transform their school environment. Visualising a preferred future is thus a necessary step before appropriate actions can be decided and acted upon.

This example of a practical application of Jensen's model of action competence also illustrates the model's value as a method for incorporating EfS into the curriculum. It draws on students' experiences of their world, engages them in a collaborative way, and gives them a strong sense of empowerment if their actions, following the generation of their preferred future, result in positive change. This process clearly requires teachers to encourage students to identify issues where change is needed and to work closely with them to ascertain their preferred direction following an analysis of the potential consequences of their alternative imagined futures (Bateman & Smith, 2004, p. 83).
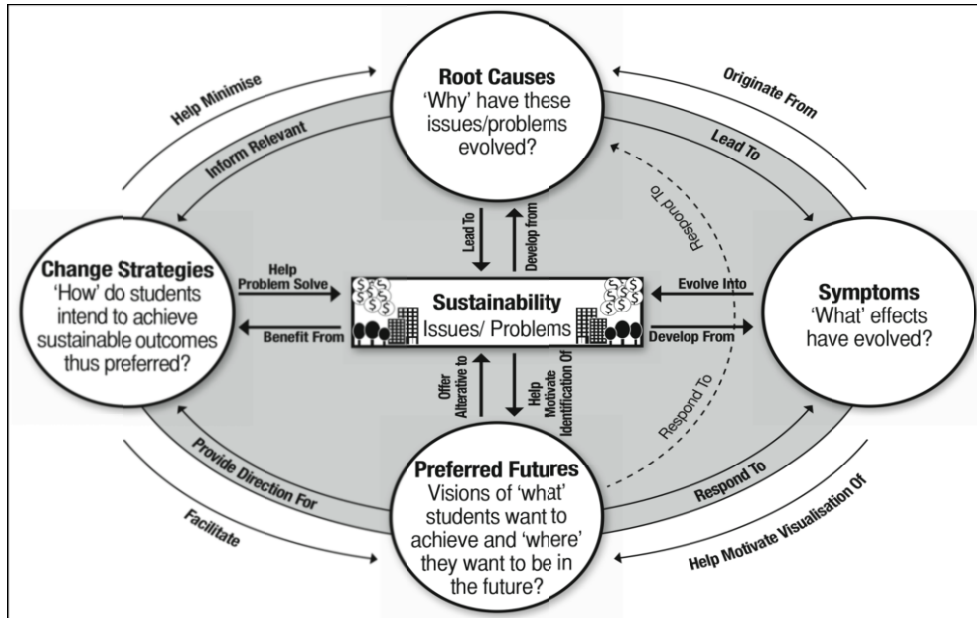
Figure 3.1. "Knowledge" required for sustainability (adapted from Jensen's model of action competence 2002, p. 330)

In Australia, the idea of action competence has been integrated into the Sustainability Curriculum Framework (AGDEWHA, 2010), which spells out the process of taking action—from making a case for change through to implementing and then evaluating specific actions. Relevant research into development of action competence in New Zealand schools has led to identification of five features that help promote students' action competence: experience, reflection, knowledge, visions for a sustainable future, and action-taking for sustainability connectedness (New Zealand Ministry of Education, 2010).

Envisioning a sustainable future necessitates teacher support through "tools and opportunities for holistic creative thinking" (New Zealand Ministry of Education, 2010). Among the range of tools available for EfS in the New Zealand context is an action planner, provided as a scaffold. The planner helps teachers and students foresee how the impact of a particular environmental problem could be minimised. It also helps them develop a plan of action to bring this vision to fruition (New Zealand Ministry of Education, 2010).

Young people can also use other specific futures tools to help them realise the sort of world in which they want to live (Inayatullah, 2008, p. 20) and strive towards. Examples include visualising, modelling (AGDEWHA, 2010, p. 10), futures wheels, mapping the past, present and future, envisioning more just and sustainable alternative futures, and deciding on a preferred future and then looking back from that future and analysing how it might be achieved. Furthermore, when students use the skills needed to generate preferred futures in combination with Jensen's model of action competence, they can markedly lessen the sense of "action paralysis" that many young people experience when confronted by what appear to

them to be almost insurmountable problems (Uzzell, Rutland, & Whistance 1995). In this respect, the model can be used to address even significant global issues, such as climate change, by facilitating the analysis of what might be done at a local level and then following up with appropriate action. These approaches can also be used to develop a wide range of higher order cognitive skills relating to critical and creative thinking, analysis and evaluation.

HOW CAN I FIT EFS INTO MY PROGRAM?

Over time, scholars and practitioners have presented many ideas about how to teach education for sustainability. EfS is certainly as much about *how* we, as teachers, teach as *what* we teach. It is also about how we live our lives both professionally and personally and thus set ourselves as examples for our students (Hogan 2006, p. 5). In addition, the "overcrowded curriculum" means that unless we feel confident and competent to teach EfS, this area of education is likely to remain a "should do" rather than a "can do".

The National Environmental Education Statement for Australian Schools suggests that the preferred pathway for implementing EfS in Australia is by "working across all curriculum areas" while simultaneously being "complemented by whole school policies and activities in other related areas" (Australian Government Department of Environment and Heritage, 2005, pp. 13–14). However, when citing problems associated with the crowded curriculum, the recent review of the Australian Curriculum advocated explicitly "embedding" sustainability only within specific content areas that curriculum planners deem directly relevant. The Australian Sustainable Schools Initiative encourages schools to integrate EfS into their curriculum and everyday management (Department of Environment and Heritage, 2005), and more schools are beginning to adopt "whole-school" approaches to sustainability. The New Zealand Curriculum (New Zealand Ministry of Education, 2007) promotes sustainability as a future-focused theme that is a rich source of learning opportunities. The Enviroschools Programme (Enviroschools Foundation, 2014) is one initiative fostering whole-school approaches to EfS in many New Zealand schools.

Figure 3.2 presents a useful model—one that teachers should find practical and easy to adopt—for integrating EfS across the curriculum. This model allows us to cover essential content, skills, attitudes, values and behavioural outcomes from the humanities and social sciences, the natural sciences, and health and physical education, while concurrently addressing literacy, numeracy and creative arts outcomes. This concurrence is achieved by identifying "rich concepts" (e.g., social justice, wellbeing, war, resources and so on) and addressing them in a cross-curricular manner. It follows that more outcomes can be met within a shorter amount of time if we integrate learning areas (LAs). In other words, we can be more efficient with the limited teaching time available to us. According to Murdoch and Hornsby (1997), students' motivation to learn is enhanced when they can deal with meaningful rich concepts as authentic "real-life" issues.

English, other languages, mathematics, the arts (visual, music, drama, dance), technology and physical education (PE, dance and movement) provide ways for students to explore, research, imagine, re-formulate, perform, communicate and evaluate rich concepts (Murdoch & Hornsby 1997, p. 14). Literacy, the creative arts, numeracy, and information and communication technology are tools that can be effectively used for inquiring, investigating,
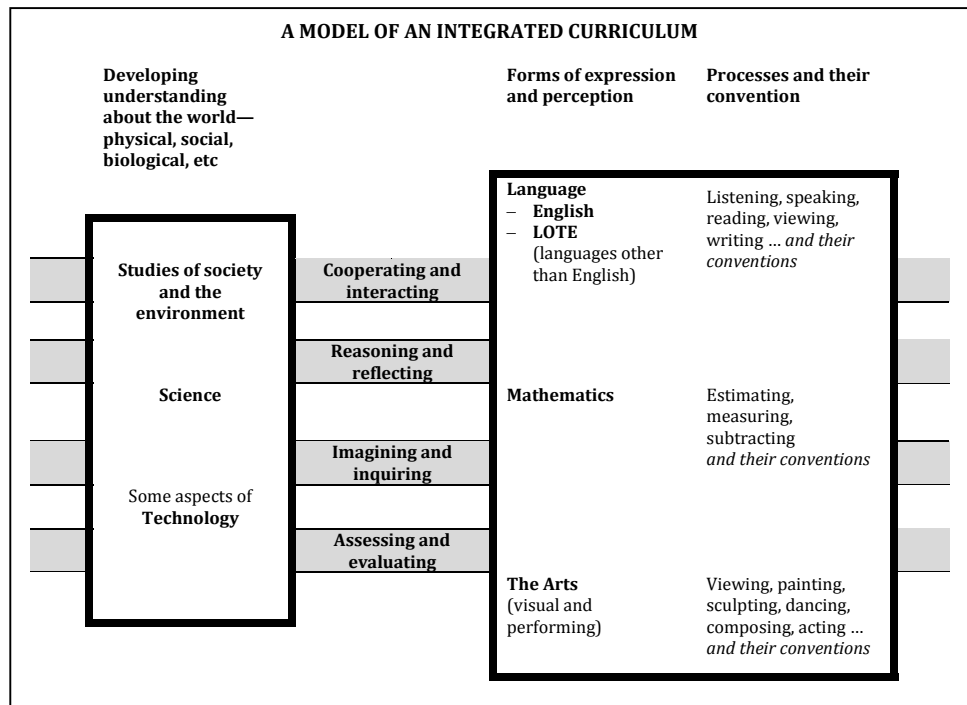
A MODEL OF AN INTEGRATED CURRICULUM

Developing understanding about the world—physical, social, biological, etc		Forms of expression and perception	Processes and their convention
Studies of society and the environment	**Cooperating and interacting**	**Language** – **English** – **LOTE** (languages other than English)	Listening, speaking, reading, viewing, writing ... *and their conventions*
	Reasoning and reflecting		
Science		**Mathematics**	Estimating, measuring, subtracting *and their conventions*
	Imagining and inquiring		
Some aspects of **Technology**	**Assessing and evaluating**	**The Arts** (visual and performing)	Viewing, painting, sculpting, dancing, composing, acting ... *and their conventions*

Figure 3.2. A model for integrating EfS across the curriculum (Murdoch & Hornsby, 1997, p. 14).

viewing, listening, reading, designing, moving, acting, performing and assessing. It is essential that all subjects (LAs), because of the varying skills and knowledges they develop, are encompassed if we are to address the interdisciplinary nature of sustainability issues.

But how can we make links between these so-called rich concepts, the pillars of sustainability and the curriculum? The following list of rich concepts (also taken from Murdoch & Hornsby, 1997, p. 18) provides some insight into how these topics can be made comprehensive enough to provide an "umbrella" for specific subtopics drawn from the various LAs. Examples of rich concepts include citizenship, ecological sustainability, human rights, justice, conflict and cooperation, social justice, needs and wants, diversity, relationships, spirituality, work and leisure, imagining and constructing a future, thinking critically, wellbeing, energy, change, power and control, inequity, the global society and time … the list goes on.

If we take, for example, the rich concept of "relationships", we can readily explore this concept in a variety of ways. Relationships can be investigated within the context of families, friends, work colleagues, communities and countries, or natural or built environments. In particular, we can examine how healthy relationships are developed and ultimately lead to improved wellbeing (health and PE). Within the natural sciences (science and technology), relationships and interactions between the biophysical world and humans could be a natural progression from the previous subtopic. The role of technology (in the

past and the present) could be incorporated into this topic by investigating how it has influenced human and non-human life.

Thus, for example, students might study interactions between the rise of factories and quality of human life. Elements of society and the environment would also feature here, with associations across the physical, social and biological worlds producing both positive and negative effects. How humans perceive and relate to the natural world can vary greatly. Some people are human centred (anthropocentric) in their thinking, regarding the natural world as a resource to be used for the benefit of the human species and with little regard for other living things. Other people are more ecologically centred (ecocentric), viewing the natural world as intrinsically valuable for its own sake as well as an integral part of our life support system—a relationship professed by many traditional societies. Examining such issues allows students to engage with a number of the LAs while discussing the why and what aspects of EfS.

Students could then proceed to envision a sustainable future that involves healthy and happy relationships at home, at work and at play and encompasses the physical, natural and social worlds. Subsequently, the students' desired sustainable future could provide the impetus for a range of change strategies to be planned. After further researching and exploring this rich concept, the students might choose to act in certain ways to improve their relationships with someone at home, at school, in the community or with the natural world. An example of their chosen action might be planning and creating a garden to supply fresh organic vegetables for the school canteen and local restaurants. This action implies learning about how to create healthy human–nature interactions and relationships.

From there, students could also be involved in fundraising to buy and then plant native vegetation to attract bird life and improve the playground environment. Additional funds raised could be donated to a local care facility for the elderly in order to make their lives more comfortable. Follow-up visits to the residents, with students perhaps performing songs/role-plays/recitations might also become a "planned" outcome. Community relationships between the young and the aged would likely be improved as a result. All these actions emanate from the students being occupied in informed problem-solving and democratic decision-making processes directed toward improving the environment, society and the economy.

In summary, Murdoch and Hornsby's integrated model and Jensen's framework for action competence can provide a valuable starting point for effective integration of EfS within a number of LAs, while allowing students to meet a broad range of outcomes. A combination of these two frameworks, along with futures tools and Australia's and New Zealand's curriculum and policy documents, could produce "small step" changes in students' behaviours. Such changes are most likely to be facilitated when students are permitted to act democratically and to make decisions and choices predicated on their visions of society, economy and environment. During this process it is crucial for any action taken to have as its aim a positive environmental outcome *for* the future as well as other relevant and worthwhile educational outcomes related to curriculum contexts.

CONCLUSION

In this chapter, I examined different theories of learning and their association with changing pedagogies from those centred on the teacher and the transmission of knowledge, to those centred on the student and the construction of knowledge with the teacher as facilitator. The vision for education, according to UNESCO (2002, pp. 10–11), is to foster capacity for futures thinking and to emphasise teachers' roles as agents of change. I also, in this chapter, discussed how adopting Murdoch and Hornsby's (1997) model of integration with Jensen's knowledges makes it possible to integrate EfS into the curriculum. This approach allows teachers to employ effective learning and teaching practice based on constructivist theory and student experiences. For students, use of these theories and models enables them to explore issues of sustainability in ways that involve personal and societal actions, with these actions not only contributing towards their preferred visions of a sustainable future but also developing significant higher-order cognitive skills.

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