



# The status of education for sustainability in initial teacher education programmes: a Canadian case study

Thomas Falkenberg and Gary Babiuk

*Faculty of Education, University of Manitoba, Winnipeg, Canada*

## Abstract

**Purpose** – The purpose of this paper is to establish the status of education for sustainability in the teacher education programmes in the province of Manitoba in Canada and to identify challenges and obstacles for mainstreaming education for sustainability in those programmes.

**Design/methodology/approach** – Using a multi-unit case study design, online programme information and data from interviews with faculty administrators and a convenience sample of faculty members from all five faculties of education in Manitoba were collected and analysed.

**Findings** – There is no systematic and focused preparation of teachers for education for sustainability in any of the Manitoba teacher education programmes. Three challenges for mainstreaming of education for sustainability are identified: lack of leadership, an unfavourable view of the role of education for sustainability and the silo-ing within faculties of education.

**Research limitations/implications** – The research is limited by its focus on the programme-based implementation of education for sustainability in faculties of education, which did not include any course-based implementation by individual instructors.

**Practical implications** – To address the challenges and obstacles for mainstreaming, the authors argue for joint leadership across the relevant institutional levels (government, university and faculty), and for establishing education for sustainability as a framework for responding to the purpose question of school education.

**Originality/value** – The study provides empirical evidence for some of the major challenges for mainstreaming education for sustainability in faculties in education and, by generalisation, all university faculties.

**Keywords** Canada, Teacher education, Education for sustainability, Reorienting teacher education to address sustainability, Mainstreaming teacher education for sustainability

**Paper type** Research paper

## 1. Introduction: the preparation of teachers for education for sustainability

The concern for sustainability is the concern for creating and sustaining the conditions for current and future generations of humans to live well on the Earth. The *unsustainability* of the current economic (Jackson, 2009), socio-cultural (Worldwatch

The authors want to express their great appreciation to the Canadian Council on Learning and Manitoba Education for the financial support of the study and to Heather Hunter, Director of the Manitoba Education Research Network (MERN), whose logistical work made the financial support possible in the first place.



---

Institute, 2010) and environmental (Laszlo, 2009) conditions have been well-documented and give great urgency to addressing the issue. Education has been seen as “a critical tool in the transformation towards sustainability” (Firth and Winter, 2007, p. 600); therefore, it is no surprise that educational research has studied education as such a transformative tool for the K-12 school system (Robertson and Krugly-Smolka, 1997; Summers *et al.*, 2005), the tertiary system (Mochizuki and Fadeeva, 2010; Minguet *et al.*, 2011) and in informal/non-formal education settings (Wheeler, 2007; Mahruf *et al.*, 2011). In terms of the changes needed to address such transformation, three areas of the educational process have been identified:

- (1) curriculum (Blewitt and Cullingford, 2004; Hopkins *et al.*, 1996; Paige *et al.*, 2008; Robertson and Krugly-Smolka, 1997);
- (2) pedagogy (Firth and Winter, 2007; Gadotti, 2010; Sterling, 2001); and
- (3) teacher education.

This article focuses on the third area.

Starting in 1998, United Nations Educational, Scientific and Cultural Organization (UNESCO) initiated work on “reorienting teacher education toward sustainability”, which led to the UNITWIN/UNESCO Chair on Reorienting Teacher Education to Address Sustainability at York University in Toronto, Canada, and the formation of an International Network of Teacher Education Institutions (McKeown and Hopkins, 2007), the work of which has been leading to a series of monographs (Hopkins *et al.*, 2007; Hopkins and McKeown, 2005; McKeown, 2006).

The reorientation of teacher education is sometimes promoted as “mainstreaming” of education for sustainability in teacher education programmes, where:

[...] mainstreaming here refers to the incorporation of ESD philosophy, content and activities within an initial teacher education system to such an extent that ESD becomes embedded within all policies and practices (Ferreira *et al.*, 2007a, p. 226).

The authors of this article do not know of any literature that reports on the mainstreaming of education for sustainability in any teacher education programme in any country. For instance, Nolet (2009) writes about the recent situation in the USA that “today, sustainability education is almost nonexistent in the teacher education curriculum in the USA” (p. 430) – a judgement which has not much changed since (Nolet, 2013, p. 54); Ferreira *et al.* (2007a, p. 227) write that “[their] research was unable to find a teacher education institution in Australia that has mainstreamed ESD approaches across its initial teacher education programmes” (Ferreira *et al.*, 2007b). However, the literature documents various degrees of integrating education for sustainability into different aspects of teacher education programmes, as, for instance, in Australia (Fien and Maclean, 2000; Ferreira *et al.*, 2007a), Jamaica (Down, 2006), Great Britain (Firth and Winter, 2007), Canada (Alsop *et al.*, 2007) and a number of other countries of members of the International Network of Teacher Education Institutions mentioned previously (McKeown, 2007).

For over ten years, UNESCO has been publishing a series of monographs on the integration of education for sustainability, for instance, an extensive list of guidelines and recommendations for reorientation (Hopkins and McKeown, 2005), illustrative examples of “good practices” of integrating education for sustainability into teacher education programmes (McKeown, 2007), a list of educational processes and learning

conducive to education for sustainability (Tilbury, 2011), a list of relevant competencies for educators (UNECE, 2012) and even a completely mainstreamed teacher education curriculum (UNESCO, 2010). Why is there no mainstreaming to be found (yet)?

The most comprehensive overview of challenges to the reorienting of teacher education towards education for sustainability can be found in Hopkins and McKeown (2005). They identify four classes of challenges (pp. 31-32):

- (1) lack of awareness, support and resources at the teacher education institutional level;
- (2) lack of prioritising sustainability in the educational community;
- (3) the common orientation when reforming education systems and structures (which does not give consideration to education for sustainability and is generally undertaken within the traditional disciplinary curriculum frameworks, which makes the incorporation of the transdisciplinary education for sustainability a challenge); and
- (4) lack of establishing and sustaining partnerships (lack of partnerships with communities in which education for sustainability is taking place and lack of coordinated efforts between different branches of governments beside ministries of education).

The list has been established on the basis of reports by members of the International Network of Teacher Education Institutions (Hopkins and McKeown, 2005, p. 30). A number of case studies – generally attempts to integrate education for sustainability into particular courses in a teacher education programme – support instances of that list (Down, 2006; Firth and Winter, 2007).

While the referenced literature suggests that there is no mainstreaming of education for sustainability in teacher education programmes anywhere, two obvious questions arise:

- (1) How far has such mainstreaming of teacher education institutions come in different jurisdictions?
- (2) Why is there no mainstreaming in a particular jurisdiction?

The study presented upon in this article addresses these two questions for one particular province in Canada. The study, thus, contributes to UNESCO's work on indicators to track progress and assess the impact of the United Nations (UN) Decade of Education for Sustainability (Tilbury, 2007; Tilbury and Janousek, 2007; Tilbury *et al.*, 2007), which is part of the International Implementation Scheme for the UN Decade of Education for Sustainability (UNESCO, 2005, p. 23). More specifically, the study will provide qualitative indicators (Tilbury, 2007, p. 241) for the level of progress and the impact of the UN Decade on teacher education programmes in Manitoba, Canada. As will be outlined in further text, Manitoba has a particular status within Canada in terms of the importance that education for sustainability is given by the provincial government. While there are some studies that look at the mainstreaming question at the school level in Manitoba (Swayze and Creech, 2009), the authors do not know of any study that inquires into the status of education for sustainability in Canadian teacher education programmes at the institutional level, and if there is no mainstreaming, what challenges are suggested for such mainstreaming. This is the focus of this study.

---

## 2. The study

In 2009-2010, the authors of this article undertook a study that inquired into the status of education for sustainability in teacher education programmes in Manitoba. Manitoba has a particular status within Canada in terms of the promotion of education for sustainability in the K-12 school system by the provincial government (Buckler and MacDiarmid, 2013; Babiuk and Falkenberg, 2010, pp. 81-87). Education is a provincial responsibility in Canada, and education for sustainability is one of the five Priority Action Areas of the ministry of education in Manitoba (Manitoba Education, 2014), and the ministry has published a number of documents for educators and schools on education for sustainability (Manitoba Education and Training, 2000; Perry, 2011) and has taken the lead in education for sustainability at the national level in Canada through its leading role at the Council of Ministers of Education (CMEC, 2007). Buckler and MacDiarmid (2013) and Hopkins (2013) provide some evidence that the provincial government's push for education for sustainability and the resource allocation has had some positive impact on the integration of education for sustainability into the K-12 school system.

While there are some studies reporting on individual faculty members' or some faculty-wide initiatives linked to education for sustainability (Alsop *et al.*, 2007; Dippo, 2013), to the authors' knowledge there are no empirical baseline studies of the status of education of sustainability in Canadian or any of its provinces.

With this gap in the research literature in mind, the study reported here explored the following two questions:

- (1) What is the status of education for sustainability in Manitoba initial teacher education programmes?
- (2) What are challenges or obstacles to mainstreaming education for sustainability in Manitoba initial teacher education programmes?

Because the research was to study "an issue explored through one or more cases within a bounded system" (Creswell, 2007, p. 73) – with the Manitoba initial teacher education context as the bounded system – the authors chose a case study approach to address the two research questions. More specifically, we have chosen a single-case multiple-units case study (Yin, 2009, p. 46) with Manitoba as the single case of a provincial teacher education context and the programmes of the five faculties of education in Manitoba as the five units of analysis within the single case.

For the case study, the authors drew from two data sources for each of the five faculties of education in Manitoba:

- (1) 2009-2010 online information on the different initial teacher education programmes; and
- (2) data from nine interviews.

The interviews were conducted with the deans or associate deans of the five Manitoba faculties of education. Because of their administrative roles, they would have an overview of the structure of and course offerings in their respective teacher education programmes. The authors also interviewed a convenience sample (Creswell, 2007, p. 126) of four additional faculty members from the Manitoba teacher education institutions who were not administrators, but rather teacher educators with an interest

in sustainability issues: two science educators, one faculty member with an interest in social justice and the socio-cultural aspect of teaching more generally, and one faculty member with interests in environmental and Aboriginal education. These four faculty members were all from different faculties of education. It was the authors' view that non-administrative faculty members with an interest in education for sustainability could provide us with a supplementary view on particularly the constraints and possibilities of mainstreaming education for sustainability within their respective institution in addition to the view provided by administrators. The transcribed interviews were analysed for themes relevant to the two research questions. The small sample size is a limitation of the study, which thus has more the character of an *exploratory* qualitative case study (Creswell, 2007, p. 321).

### 3. Findings

This section is divided into two parts, each addressing one of the two research questions.

#### 3.1 *The status of education for sustainability in Manitoba's teacher education programmes*

The following findings arise from the online programme information posted for each of the teacher education programmes and the interview data. The online information was triangulated through the interview data. In two of the five pre-service teacher education programmes, standalone courses were offered that focus primarily on preparing pre-service teachers for education for sustainability. One programme offered an *elective* course on teaching sustainable development in both the integrated and the after-degree pre-service teacher education programme. The other programme offered an alternative practicum placement overseas that pre-service teachers could elect to take. As part of the practical, pre-service teachers would teach in a school in which the educational focus is on environmental sustainability.

While there are no standalone courses primarily focused on preparing pre-service teachers for education for sustainability in the other pre-service teacher education programmes, most of the faculty administrators pointed out that they see the possibility that individual course instructors might build aspects of education for sustainability into the courses they teach, or they knew of instructors who have actually done so. Three of the four faculty members selected to be interviewed because of their interest in sustainability issues (in a wider sense) said that they address sustainability issues (environmental aspects, social justice and socio-cultural aspects of sustainability) as a central part of their respective courses.

The current school curricula in Manitoba involve learning outcomes that can be linked to issues of sustainability (Manitoba Education and Training, 2000; Perry, 2011). Accordingly, courses that prepare pre-service teachers for teaching those respective subject areas prepare pre-service teachers at least in an *indirect* way for education for sustainability, as pointed out by one interviewee.

There is no *systematic* and *focused* preparation of teachers for education for sustainability in any of the Manitoba teacher education programmes undertaken as of yet. At the *programmatic* level, university-based teacher education programmes in Manitoba are almost as far away from mainstreaming the preparation of pre-service teachers for education for sustainability as seemed possible, a situation similar to the situation in the USA, as assessed by Nolet (2009). From a *course-based* perspective, the

interview data suggest that those faculty members interested and invested in issues around sustainability do address education for sustainability in their courses. The study, however, was not designed to provide detailed information in a systematic way on what that actually looks like.

Aside from inquiring into the role of education for sustainability in the respective teacher education programmes, the interviews also explored its role for the faculty as a whole. We identified only one faculty which attempts to integrate education for sustainability across its teacher education programme:

[Education for sustainability] is now [a component of the pre-service teacher education program in the interviewee's institution][...]. It's going to be part of every course.

(FM5, 29:45)

While in this faculty education for sustainability is seen as an overarching issue, interviewees from other faculties conceptualised education for sustainability as just one of many “competing” issues that the faculty is focused or can focus on.

### *3.2 Challenges and possibilities for education for sustainability in Manitoba's teacher education programmes*

From interview data, three challenges for education for sustainability in Manitoba's teacher education programmes were identified:

- (1) lack of leadership;
- (2) an unfavourable view of the role of education for sustainability; and
- (3) the silo-ing within universities in general and faculties of education in particular.

Each will be discussed, in turn.

Different interviewees identified explicitly the commitment or lack of commitment by the leadership in the faculty and/or university as a central contributing factor to the role of education for sustainability in the respective teacher education programme. There are three levels of leadership to be distinguished in this case: faculty-internal leadership; university-wide leadership; and leadership at the governmental (ministry of education) level.

The case of lack of leadership commitment to education for sustainability at the faculty-based level as an important contributing factor is illustrated by one interviewee who suggested that it is in her/his view the lack of commitment by the current faculty administration towards education for sustainability that is a major obstacle to having it play any major role in the faculty's pre-service teacher education programme. Interviewees pointed to the difference that commitment to (education for) sustainability by university and faculty-based administrators can make for the role that (education for) sustainability can play in the university and in teacher education programmes. One interviewee pointed to the role that the president of one of the universities has been playing in reorienting that university as a whole towards sustainability.

As mentioned above, the data identified one faculty of education that was working on a systematic and explicit inclusion of education for sustainability in its teacher education programme at the time our study was undertaken; it was the dean of that faculty who spearheaded this inclusion process according to the interview data.

The third type of leadership is governmental leadership where a national or provincial (state) government promotes the issue of education for sustainability through legislation, policy, directives, curricular documents or special initiatives. As described in the study, this is, indeed, the case with the current government in Manitoba.

An unfavourable view of the role of education for sustainability among faculty members was identified as the second type of challenge to the mainstreaming of education for sustainability in Manitoba's faculties of education. The study data suggest two particular issues at play.

First, preparing pre-service teachers for education for sustainability is seen as one among a number of issues that compete with each other for the attention of teacher education programmes. Second, a distinction needs to be made between faculty members' general appreciation of sustainability issues as citizens and the role that a faculty member gives those issues in her/his teaching:

I think that there are a number of faculty who appreciate the philosophy of environmental sustainability on a personal level. In terms of how that's reflected in what they teach, probably fewer. I don't think there is any sense of urgency among faculty to integrate their knowledge [around sustainability issues] broadly into their curriculum that they are teaching in (FM8, 8:10).

Illustrating this discrepancy, one faculty member who actually shared a sense of urgency for incorporating education for sustainability into teacher education expressed her/his challenge to incorporating education for sustainability into her/his course teaching as a matter of competing with other important issues of learning to teach:

When you look at science education, I am really conflicted here [in terms of incorporating education for sustainability], and I have to be honest. I know that document that was put out by Manitoba Education. It was supposed to guide the development of resources on sustainability. I realize, they pinpoint some of the outcomes in the science curriculum that could be taught through sustainability topics, but I feel like, in the position I have, in a [short] course [...] I have to help them gain confidence in understanding the material in [...] the curriculum. And I honestly don't even address [sustainability topics] (FM2, 12:10).

In the interview, one faculty member pointed to a third challenge to a programmatic commitment to preparing pre-service teacher for education for sustainability: silo-ing at the university, in general, and faculties of education in particular. Silo-ing refers to the specialisation in universities that have led to an institutionalised compartmentalisation of interests and commitments that then build a barrier for interdisciplinary approaches that allow to address the interconnectedness that characterises the concept of sustainability.

#### **4. Discussion and implications**

The study presented here suggests that the UN Decade had only a small impact on the design of and offerings in Manitoba initial teacher education programmes. Only one faculty in Manitoba was at the time of the study in the process of mainstreaming education for sustainability. The situation in Manitoba's faculty of education is in stark contrast to the exemplary promotion of education for sustainability at the ministerial level. This contrast gives rise to a number of issues linked to the problem of mainstreaming education for sustainability in teacher education programmes in Manitoba as well as around the world more generally.

---

The contrast just pointed out is not untypical, as the case of England illustrates. “Following its first inclusion in the revised National Curriculum for the year 2000, ESD is now firmly a part of the curriculum landscape for schools in England and Wales” (Summers *et al.*, 2005, p. 624). However, the changes in the National Curriculum:

[...] [have] not yet been widely taken up [in teacher education programs] in England [...]. It is widely recognized that as in schools, efforts to mainstream ESD within teacher education have tended to involve educators already interested in or committed to this area of learning. (Firth and Winter, 2007, p. 600)

Firth and Winter (2007) suggest that education for sustainability has not been taken up in England, “because there are no statutory requirements to address sustainability and teacher certification guidelines rarely mention it” (p. 600). In Manitoba, the government provides documents that help teachers integrate education for sustainability into their curricular teaching (Perry, 2011), but such integration is not mandated. Should the government in Manitoba use, for instance, its power to regulate teacher certification to mandate the integration of education for sustainability in Manitoba’s teacher education programmes?

Without doubt, such mandating would result in Manitoba teacher education institutions having to pay greater attention to education for sustainability within their programmes. However, two issues arise. First, studies on the governance of teacher education in different countries suggest that there is a difference in the governance in different jurisdictions, particularly between England and Manitoba and some other Canadian provinces (Young *et al.*, 2007). England, it is suggested, has a teacher education governance structure that is very centralised with the governance of the programmes lying dominantly with the national government, while in Manitoba the governance is more balanced between the provincial government, the faculties of education and the teaching profession. Such differences in the *political culture* do not just potentially explain why there is no top-down approach by the government in Manitoba, but they are also to be considered in any generalised suggestions for strategies for mainstreaming education for sustainability in teacher education programmes.

Second, within a political culture as described for Manitoba, mandating the integration of education for sustainability into teacher education programmes through teacher certification requirements set by the provincial government might not have the needed impact. The transdisciplinary and integrative character of education for sustainability (McKeown and Nolet, 2013, p. 8) will require the participation and, thus, the buy-in by all or at least most teacher educators within a programme. Such needed reorientation cannot be mandated.

What rather might be needed are two steps that are directly linked to challenges to mainstreaming identified in this study. The first step is linked to the leadership challenges identified in the study, a point that is also linked to Hopkins and McKeown’s (2005, pp. 31-32) list of challenges to teacher education reorientation. The importance of institutional leadership is illustrated in cases where university-wide initiatives to integrate a sustainability focus lead to an integration of education for sustainability into teacher education programmes as those universities (Martin *et al.*, 2007; Nolet, 2009; Stir, 2006). Furthermore, the important role of institutional leadership for *whole-system changes* is well-documented and discussed in the literature on educational change (Fullan, 2001, 2010; Levin, 2007, 2010).



Aside from being the driving force, institutional leadership can play a central role in *enabling* a reorientation that might be driven by a group of faculty members. For instance, Hopkins and McKeown (2005, p. 29) identify particularly two *enablers* for change in faculties of education which are to a good degree in the hands of institutional leadership: release time and funding support. Where governmental leadership in education for sustainability exists – as is the case in Manitoba – impacting the institutional leadership at the faculty and university level seems to be crucial to enable a whole-system change as is needed for education for sustainability. For Manitoba, for instance, the creation of a council of educational leaders in the province might promise a fruitful path to take (Babiuk and Falkenberg, 2010, pp. 207-208).

Support at the institutional and governmental leadership level can set the needed context and can provide the needed support for the second step, the reorientation of teacher educators for education for sustainability. As other studies mentioned above found as well, this case study identifies as one of the challenges to mainstreaming education for sustainability in initial teacher education programmes the widespread view that education for sustainability is only one among many issues relevant in teacher education (see also Hopkins and McKeown, 2005, pp. 31-32). In our view, a very promising approach to addressing this challenge is to move the discussion at all educational levels – at the school and the teacher education levels – to the question of *purpose of education*: What should we educate students for in schools? Education for sustainability is at its core a *moral* endeavour: our responsibility to the well-being of *all* people of this and *future* generations. Alsop *et al.* (2007) express a similar view, when they write, “ESD [...] has always been a question, not an answer” (p. 220), and “as a question, ESD forces a reconsideration of educational purpose” (p. 221). As a question that forces us to reconsider the educational purpose of the K-12 school system, education for sustainability can provide us with a *framework* for what K-12 schooling is and should be all about (McKeowan and Nolet, 2013, pp. 14-15).

Promoting education for sustainability as a framework for a meaningful response to the purpose question of education seems to us the most promising approach to supporting the development of a *joint* institutional leadership as well as a reorientation of teacher educators towards sustainability. While reorienting teacher education programmes towards sustainability will (have to) take forms that are appropriate to the respective local context (Hopkins and McKeown, 2005), the steps – *joint* institutional leadership and addressing the questions of the purpose of education – seem to us appropriate beyond any local context.

## 5. Conclusion

In 2014, the UN Decade of Education for Sustainable Development comes to an end. Reorienting teacher education towards sustainability has been an integrative component of the Decade. Research studies suggest a number of challenges that such reorienting is facing, and to the authors’ knowledge, there is no research to date claiming mainstreaming education for sustainability in a pre-service teacher education programme in any jurisdiction. The ministry of education in Manitoba, one of Canada’s ten provinces, has been promoting education for sustainability for the K-12 school system in an exemplary way. However, as this study demonstrates, there is no systematic and focused preparation of teachers for education for sustainability in any of

the teacher education programmes in Manitoba. The study identifies three challenges for mainstreaming of education for sustainability within the Manitoba context:

- (1) lack of leadership at the faculty and university level;
- (2) an unfavourable view of the role of education for sustainability in the faculties; and
- (3) the silo-ing within faculties of education.

Considering the enablers identified in the literature on whole-systems change in educational settings, in general, and on mainstreaming of education for sustainability in teacher education programmes, in particular, the most promising approach to overcoming these and other challenges for mainstreaming education for sustainability is, first, to establish education for sustainability as a framework for responding to the purpose question of (school) education and, second, to use this framework to build joint leadership across the relevant institutional levels (government, university and faculty) addressing the challenges for mainstreaming education for sustainability.

## References

- Alsop, S., Dipppo, D. and Zandvliet, D.B. (2007), "Teacher education as or for social and ecological transformation: place-based reflections on local and global participatory methods and collaborative practices", *Journal of Education for Teaching*, Vol. 2 No. 2, pp. 207-223.
- Babiuk, G., Falkenberg, T., Deer, F., Giesbrecht, S. and Singh, S. (and the leaders of 7 individual research projects) (2010), "Sustainable development and living through changing teacher education and teaching in Manitoba", report prepared for Manitoba Education and the Canadian Council on Learning, available at: <http://home.cc.umanitoba.ca/~falkenbe/Publications/Publications.html>
- Blewitt, J. and Cullingford, C. (Eds) (2004), *The Sustainability Curriculum: The Challenge for Higher Education*, Earthscan, London.
- Buckler, C. and MacDiarmid, A. (2013), "Education for sustainable development in Manitoba: a provincial-wide approach", in McKeown, R. and Nolet, V. (Eds), *Schooling for Sustainable Development in Canada and the United States*, Springer, Dordrecht, pp. 95-108.
- CMEC (2007), *Report to UNECE and UNESCO on Indicators of Education for Sustainable Development*, Council of Ministers of Education Canada, Toronto, Ontario.
- Creswell, J.W. (2007), *Qualitative Inquiry & Research Design: Choosing among Five Approaches*, Sage Publications, Thousand Oaks, CA.
- Dipppo, D. (2013), "Preservice teaching and pedagogies of transformation", in McKeown, R. and Nolet, V. (Eds), *Schooling for Sustainable Development in Canada and the United States*, Springer, Dordrecht, pp. 69-78.
- Down, L. (2006), "Addressing the challenges of mainstreaming education for sustainable development in higher education", *International Journal of Sustainability in Higher Education*, Vol. 7 No. 4, pp. 390-399.
- Ferreira, J.-A., Ryan, L. and Tilbury, D. (2007a), "Mainstreaming education for sustainable development in initial teacher education in Australia: a review of existing professional development models", *Journal of Education for Teaching*, Vol. 33 No. 2, pp. 225-239.
- Ferreira, J.-A., Ryan, L. and Tilbury, D. (2007b), "Planning for success: factors influencing change in teacher education", *Australian Journal of Environmental Education*, Vol. 23 No. 1, pp. 45-55.

- Fien, J. and Mclean, R. (2000), "Teacher education for sustainability: two teacher education projects from Asia and the Pacific", in Wheeler, K.A. and Bijur, A.P. (Eds), *Education for a Sustainable Future: A Paradigm for the 21st Century*, Kluwer Academic, New York, NY, pp. 91-111.
- Firth, R. and Winter, C. (2007), "Constructing education for sustainable development: the secondary school geography curriculum and initial teacher training", *Environmental Education Research*, Vol. 13 No. 5, pp. 599-619.
- Fullan, M. (2001), *The New Meaning of Educational Change*, 3rd ed., Teachers College Press, Irwin Publishing, New York, NY, Toronto.
- Fullan, M. (2010), *All Systems Go: The Change Imperative for Whole System Reform*, Corwin, Thousand Oaks, CA.
- Gadotti, M. (2010), "Reorienting education practices towards sustainability", *Journal of Education for Sustainable Development*, Vol. 4 No. 2, pp. 203-211.
- Hopkins, C. (2013), "Education for sustainable development in formal education in Canada", in McKeown, R. and Nolet, V. (Eds), *Schooling for Sustainable Development in Canada and the United States*, Springer, Dordrecht, pp. 23-36.
- Hopkins, C.A. and McKeown, R. (2005), *Guidelines and Recommendations for Reorienting Teacher Education to Address Sustainability*, UNESCO, Paris.
- Hopkins, C., Damlamian, J. and López Ospina, G. (1996), "Evolving towards education for sustainable development: an international perspective", *Nature & Resources*, Vol. 32 No. 3, pp. 2-11.
- Hopkins, C., International Network of Teacher Education Institutions and McKeown, R. (Eds) (2007), *Good Practices in Teacher Education Institutions*, UNESCO, Paris.
- Jackson, T. (2009), *Prosperity Without Growth: Economics for a Finite Planet*, Earthscan, London.
- Laszlo, E. (2009), *Worldshift 2012: Making Green Business, New Politics, and Higher Consciousness Work Together*, McArthur & Co, Toronto, Ontario.
- Levin, B. (2007), "Sustainable, large-scale education change", *Journal of Educational Change*, Vol. 8 No. 4, pp. 323-336.
- Levin, B. (2010), "How to change 5,000 schools", in Hargreaves, A., Lieberman, A., Fullan, M. and Jopkins, D. (Eds), *Second International Handbook of Educational Change*, Springer, New York, NY, pp. 309-322.
- McKeown, R., Hopkins, C.A., Rizzin, R. and Chrystalbridge, M. (2006), *Education for Sustainable Development Toolkit*, UNESCO, Paris.
- McKeown, R., Hopkins, C. and The International Network of Teacher Education Institutions (Eds) (2007), *Good Practices in Teacher Education Institutions*, UNESCO, Paris.
- McKeown, R. and Hopkins, C. (2007), "International network of teacher education institutions: past, present and future", *Journal of Education for Teaching*, Vol. 33 No. 3, 149-155.
- McKeown, R. and Nolet, V. (2013), "Education for sustainable development in Canada and the United States", in McKeown, R. and Nolet, V. (Eds), *Schooling for Sustainable Development in Canada and the United States*, Springer, Dordrecht, pp. 3-21.
- Mahruf, M., Shohel, C. and Howes, J. (2011), "Models of education for sustainable development and nonformal primary education in Bangladesh", *Journal for Sustainable Development*, Vol. 5 No. 1, pp. 129-139.
- Manitoba Education (2014), "Mandate, mission, vision, overarching goals and priority action areas", available at: [www.edu.gov.mb.ca/edu/mandate.html](http://www.edu.gov.mb.ca/edu/mandate.html) (accessed April 2011).

- Manitoba Education and Training (2000), *Education for a Sustainable Future: A Resource for Curriculum Developers, Teachers, and Administrators*, Manitoba Education and Training, Winnipeg, Manitoba.
- Martin, K., Summers, D. and Sjerps-Jones, H. (2007), "Sustainability and teacher education", *Journal of Further and Higher Education*, Vol. 31 No. 4, pp. 351-362.
- Minguet, P.A., Martinez-Agut, M.P., Palacios, B., Piñero, A. and Ull, M.A. (2011), "Introducing sustainability into university curricula: an indicator and baseline survey of the views of university teachers at the University of Valencia", *Environmental Education Research*, Vol. 17 No. 2, pp. 145-166.
- Mochizuki, Y. and Fadeeva, Z. (2010), "Competences for sustainable development and sustainability: significance and challenges for ESD", *International Journal of Sustainability in Higher Education*, Vol. 11 No. 4, pp. 391-403.
- Nolet, V. (2009), "Preparing sustainability-literate teachers", *Teachers College Record*, Vol. 111 No. 2, pp. 409-442.
- Nolet, V. (2013), "Teacher education and ESD in the United States: the vision, challenges, and implementation", in McKeown, R. and Nolet, V. (Eds), *Schooling for Sustainable Development in Canada and the United States*, Springer, Dordrecht, pp. 53-67.
- Paige, K., Lloyd, D. and Chartres, M. (2008), "Moving towards transdisciplinarity: an ecological sustainable focus for science and mathematics pre-service education in the primary/middle years", *Asia-Pacific Journal of Teacher Education*, Vol. 36 No. 1, pp. 19-33.
- Perry, J. (2011), *Education for Sustainable Development: Kindergarten to Grade 12 Correlation Chart Template and Kindergarten Tool Kit*, Manitoba Education, Winnipeg, Manitoba.
- Robertson, C.L. and Krugly-Smolksa, E. (1997), "Gaps between advocated practice and teaching realities in environmental education", *Environmental Education Research*, Vol. 3 No. 3, pp. 311-326.
- Sterling, S. (2001), *Sustainable Education: Re-visioning Learning and Change*, Green Books, Devon.
- Stir, J. (2006), "Restructuring teacher education for sustainability: student involvement through a 'strength model'", *Journal of Cleaner Production*, Vol. 14 Nos 9/11, pp. 830-836.
- Summers, M., Childs, A. and Corney, G. (2005), "Education for sustainable development in initial teacher training: issues for interdisciplinary collaboration", *Environmental Education Research*, Vol. 11 No. 5, pp. 623-647.
- Swayze, N. and Creech, H. (2009), *Sustainability Policies at the School Division Level in Manitoba: The Status of Policy Development and its Relationship to Actions in Schools*, International Institute for Sustainable Development, Winnipeg, Manitoba.
- Tilbury, D. (2007), "Monitoring and evaluation during the UN Decade of Education for Sustainable Development", *Journal of Education for Sustainable Development*, Vol. 1 No. 2, pp. 239-254.
- Tilbury, D. (2011), *Education for Sustainable Development: An Expert Review of Processes and Learning*, UNESCO, Paris.
- Tilbury, D. and Janousek, S. (2007), *Asia-Pacific Guidelines for the Development of National ESD Indicators*, UNESCO Asia and Pacific Regional Bureau for Education, Bangkok.
- Tilbury, D., Janousek, S., Denby, L., Elias, D. and Bacha, J. (2007), *Monitoring and Assessing Progress During the UNDESD in the Asia-Pacific Region: A Quick Guide to Developing National ESD Indicators*. UNESCO Asia and Pacific Regional Bureau for Education, Bangkok.
- UNECE (2012), *Learning for the Future: Competences in Education for Sustainable Development*, United Nations Economic Commission for Europe, Geneva.

- UNESCO (2005), *International Implementation Scheme*, UNESCO, Paris.
- UNESCO (2010), *Teaching and Learning for a Sustainable Future: A Multimedia Teacher Education Program*, UNESCO, Paris, available at: [www.unesco.org/education/tlsf/](http://www.unesco.org/education/tlsf/)
- Wheeler, K.A., (2007), "Learning for deep change", *Journal of Education for Sustainable Development*, Vol. 1 No. 1, pp. 45-50.
- Worldwatch Institute (2010), *State of the World 2010: Transforming Cultures: From Consumerism to Sustainability*, Norton, New York, NY.
- Yin, R.K. (2009), *Case Study Research: Design and Methods*, 4th ed., Sage Publications, Thousand Oaks, CA.
- Young, J., Hall, C. and Clarke, T. (2007), "Challenges to university autonomy in initial teacher education programmes: the cases of England, Manitoba and British Columbia", *Teaching and Teacher Education*, Vol. 23 No. 1, pp. 81-93.

**About the authors**

Thomas Falkenberg is an Associate Professor in the Faculty of Education of the University of Manitoba, Canada. His research interests include teacher education and education for sustainability. He is currently the coordinator of the interdisciplinary research group "Education for Sustainable Well-Being" at the University of Manitoba. Thomas Falkenberg is the corresponding author and can be contacted at: [tfalkenberg@umanitoba.ca](mailto:tfalkenberg@umanitoba.ca)

Gary Babiuk is an Assistant Professor in the Faculty of Education of the University of Manitoba, Canada. His research interests include holistic education, inquiry learning and interdisciplinary curriculum, as it pertains to Education for Sustainability.

---