Scaling up, Scaling out, and Scaling in: Facilitating effective Education for Sustainability through a Decentralized Global Network

Thesis
Submitted in Fulfilment of the Requirements for Doctor of Philosophy

Michael Stewart Duggan
Master of Teaching
Bachelor of Recreation and Leisure Studies
Faculty of Arts and Business,
School of Social Sciences
Sustainability Research Centre,
University of the Sunshine Coast Maroochydore DC 4558
August 2nd, 2015
Abstract

The facilitation of Education for Sustainability (EfS) by Decentralized Global Networks (DGNs) is consistent with the dynamic and increasingly complex nature of sustainability issues and is often motivated by inter-governmental policy objectives that link sustainability learning with sustainable development. Current approaches endorsed by DGNs support the implementation of EfS programs at multiply scales including local and global contexts, and engage teachers, teacher-educators, policy makers and the wider community in re-orienting education towards sustainability. The practice of using DGNs in the provision of EfS is now well established and supports the participation of a geographically dispersed and diverse body of participants. Notwithstanding, there is still limited understanding of the complex systems operating within DGNs and how these systems generate the conditions necessary to facilitate EfS at organizational and program levels. The aim of this research is to identify the inherent dimensions, along with challenges and opportunities seen as characteristic of the effective facilitation of EfS by DGNs. The author’s investigation is centred on a qualitative case study of the Environment and School Initiatives (ENSI)—a DGN in operation for over 26 years with a membership that has spanned over 25 countries. The analysis is further extended through examination of four program-level case studies. The findings from this research identify organizational and program level approaches to EfS facilitation encompassing 11 dimensions considered to be conducive to a DGNs facilitation of effective EfS, for example; i) addressing the nexus created between policy, research and practice; ii) applying a structured approach to network decentralization; iii) monitoring and evaluating processes and outcomes; and, iv) developing an organization focused on learning and the advancement of networks more broadly. In addition, synthesis of these 11 dimensions resulted in the identification of four challenges and five opportunities that impact upon a DGNs facilitation of effective EfS across multiple scales. In conclusion, the research findings identify that DGNs approach is multi-scale, contextual and relevant to participants, and confronts the gap between the paradigms of policy, research and practice enabling these networks to more readily address the effective facilitation of EfS. Noticeably, these approaches increase the capacity of teachers and participants to deliver effective EfS and can be seen to address the more general role of education in embedding sustainability in our society.
Declaration of Originality and Authorship

I declare that all content contained within this thesis and the journal articles submitted and published as components of this work are original content stemming from research and analysis conducted during the course of this research program. Material used in the production of this thesis belonging to other authors is recognized accordingly and cited in the body of the text and reference sections.

Michael Stewart Duggan
August 2nd, 2015

Acknowledgements and Dedication

The author acknowledges the contributions of the Environment and School Initiatives (ENSI), and the research support and key research resources contributing to the production of this thesis provided by the Faculty of Arts and Business and the Sustainability Research Centre at the University of the Sunshine Coast, Queensland, Australia. Particularly, Supervisors Prof. Tim Smith and Dr. Dana Thomsen have been supportive and critical throughout the entire process and the author appreciates their diligence throughout seven years of study. The author would also like to acknowledge the Gladstone Campus of the Central Queensland University for providing resources, specifically the use of an adjunct office during the last three years of the research. The author moved to Gladstone, Queensland, Australia in early 2012 and the provision of these premises were of great assistance in enabling continued research at a location remote from the University of the Sunshine Coast.

In addition, the author thanks his Mother, Margaret Duggan, for providing editing services over a five month period leading into the submission of this thesis. Having edited his papers since High School you have gone above and beyond with this paper. Finally, of the highest importance, the author acknowledges the support and patience of his family in continuing to stick with him as he spent many evenings and weekends at the University conducting this research. The thesis is dedicated to my wife Lauren, and children, Addison and Tyler. I appreciate the gift of time that you have provided me and intend on paying it back over the coming years.
### Table of Contents

Abstract................................................................................................................................. ii
Declaration of Originality and Authorship ................................................................. iii
Acknowledgements and Dedication ................................................................................ iii
List of Figures....................................................................................................................... v
List of Tables ........................................................................................................................ vi
List of Appendices .............................................................................................................. vii
List of Acronyms ................................................................................................................ viii

Statement of Journal Articles Contribution by Others ................................................. ix
Publications arising from this thesis ............................................................................. ix

Chapter 1. Introduction ............................................................................................................ 2
  1.1 Research Context and Rationale ................................................................................. 4
  1.2 Research Significance ................................................................................................. 8
  1.3 Research Problem and Questions .............................................................................. 10
  1.4 Thesis Outline ............................................................................................................ 11

Chapter 2. Literature Review .............................................................................................. 15
  2.1 Introduction .................................................................................................................. 15
  2.2 Worldviews, Ethics and Understanding Environmental and Sustainability Discourse ......................................................................................................................... 17
  2.3 From About to In to For: The Waves of Education for Sustainability...................... 22
  2.4 Sustainability Learning as a Facilitative Process ...................................................... 30
  2.5 International Not-for-Profit Organizations ................................................................ 33
  2.6 Monitoring and Evaluating EfS .................................................................................. 36
  2.7 Chapter Two Conclusion ............................................................................................ 42

Chapter 3. Scalability ....................................................................................................... 47
  3.1 Introduction .................................................................................................................. 50
  3.2 Enabling Information Exchange and Educational Programmes .................................. 52
  3.3 A Broader Scope for Educational Investment ............................................................... 54
  3.4 Approaches that Effectively Link Local and Global Scales .......................................... 56
  3.5 Decentralized Global EfS Organizations .................................................................... 61
  3.6 Conclusion ................................................................................................................... 63

Chapter 4. Research Design .............................................................................................. 69
  4.1 Introduction .................................................................................................................. 69
  4.2 Philosophical Position ................................................................................................. 70
  4.3 Theoretical Framework ............................................................................................... 73
  4.4 Research Methods and Process .................................................................................. 74
  4.5 Case Study Approach ................................................................................................. 78
    4.5.1 Case Studies .......................................................................................................... 80
    4.5.2 Case Study Selection Criteria ............................................................................... 81
    4.5.3 Ensuring Research Rigor ....................................................................................... 84
### List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Types of networks</td>
</tr>
<tr>
<td>2</td>
<td>Multi-scale framework</td>
</tr>
<tr>
<td>3</td>
<td>Research Methods</td>
</tr>
</tbody>
</table>

List of Chapters

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>5.2</td>
<td>Application of the Research Approach</td>
</tr>
<tr>
<td>5.3</td>
<td>Results and Discussion</td>
</tr>
<tr>
<td>5.3.1</td>
<td>Organizational Approaches to the Facilitation of Education for</td>
</tr>
<tr>
<td></td>
<td>Sustainability: An Interpretive Case Study</td>
</tr>
<tr>
<td>5.3.2</td>
<td>Dimensions of effective Education for Sustainability: A comparative</td>
</tr>
<tr>
<td></td>
<td>analysis of four programs</td>
</tr>
<tr>
<td>5.3.3</td>
<td>Challenges and opportunities to facilitating effective Education for</td>
</tr>
<tr>
<td></td>
<td>Sustainability: A synthesis of organizational and program dimensions</td>
</tr>
<tr>
<td>5.4</td>
<td>Chapter Five Conclusion</td>
</tr>
<tr>
<td>6.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>6.2</td>
<td>Purpose of the Study</td>
</tr>
<tr>
<td>6.3</td>
<td>Knowledge Contributions</td>
</tr>
<tr>
<td>6.4</td>
<td>Implications for the Facilitation of EfS</td>
</tr>
<tr>
<td>6.4.1</td>
<td>Partner Networks</td>
</tr>
<tr>
<td>6.5</td>
<td>Implications for Future Research</td>
</tr>
<tr>
<td>6.5.1</td>
<td>Monitoring and Evaluation Framework for DGNs Facilitating EfS</td>
</tr>
<tr>
<td>6.5.2</td>
<td>A multi-scale approach inclusive of reflective dimensions</td>
</tr>
<tr>
<td>6.5.3</td>
<td>Investigating propositional and procedural knowledge</td>
</tr>
<tr>
<td>6.6</td>
<td>Concluding Reflection on the Research Process</td>
</tr>
<tr>
<td>6.7</td>
<td>Chapter Six Conclusion</td>
</tr>
</tbody>
</table>

References                                                                 |

Appendices                                                                 |
Figure 4. Triangulation of data ................................................................. 86
Figure 5. The decentralized global network’s strategy-node-program framework ..... 131
Figure 6. Multi-scale framework ........................................................................ 175
Figure 7. Translation of research to practice through a regional node ......................... 186
Figure 8. A future-focused approach to scale ............................................................... 213

List of Tables

Table 1. Major thrusts throughout the UN-DESD ............................................................ 5
Table 2. UN-DESD and GAP-ESD Objectives and Action Areas .................................... 7
Table 3. Research Phases and Questions ........................................................................ 11
Table 4. Thesis Outline ................................................................................................. 12
Table 5. Functions of Environmental Education ............................................................. 15
Table 6. Worldviews and environmental approaches ..................................................... 18
Table 7. Contrasting discourse underlying alternative approaches to sustainability ...... 19
Table 8. Three dominant philosophies of environmental education .............................. 24
Table 9. Fifteen currents in environmental education .................................................... 25
Table 10. Three forms of environmental education ....................................................... 26
Table 11. Conceptual foundations of EfSD .................................................................... 28
Table 12. Social learning principles ............................................................................... 31
Table 13. Characteristics of INPOS ............................................................................... 35
Table 14. Indicator Types .............................................................................................. 40
Table 15. Literature review links to the research questions and research gaps .......... 42
Table 16. Program Context and Pre-Conditions Matrix ................................................. 57
Table 17. Four Types of Scaling Up ............................................................................... 58
Table 18. Contrasting views underlying alternative research paradigms ........................ 72
Table 19. Mixed Method Approach ............................................................................... 77
Table 20. Selected ENSI Case Study Projects ................................................................. 82
Table 21. Data relevance and applicability .................................................................... 85
Table 22. Data collection methods ................................................................................ 87
Table 23. Stages of data coding .................................................................................... 94
Table 24. Code manual .................................................................................................. 97
Table 25. Data reduction through sub-theme categorization ........................................ 100
Table 26. Sub-Themes related to Codes ....................................................................... 102
Table 27. Comparative analysis applying process-oriented criteria ............................. 106
Table 28. Chapter Five Structure ............................................................................... 114
Table 29. The Environment and School Initiatives (ENSI) case study data generation and analysis phases ................................................................. 121
Table 30. Survey respondent perceptions of the most important roles of a Decentralized Global Network (DGNs) ................................................................. 124
Table 31. ENSI’s Four Waves of Development ............................................................. 127
Table 32. Survey respondent perceptions of the most important aspects of a DGNs culture and values to the facilitation of EfS ......................................................... 135
Table 33. Four Program case studies ............................................................................ 149
Table 34. Comparative analysis applying process-oriented criteria ............................. 151
Table 35. Comparative Analysis of Four Program Case Studies ........................................ 153
Table 36. The SEED-Quality Criteria in ESD program .................................................. 156
Table 37. SUPPORT program ......................................................................................... 158
Table 38. The CoDeS program ....................................................................................... 160
Table 39. The Learnscapes program ............................................................................. 163
Table 40. The CoDeS and SUPPORT programs ............................................................ 165
Table 41. Organizational and programme dimensions characteristic of EfS facilitation .......................................................... 174
Table 42. Survey respondent perceptions’ of the most significant challenges for DGNs facilitating EfS.................................................................................................................................................................................. 177
Table 43. Survey respondents’ perceptions of the most important aspects of organizational capacity to EfS facilitation ............................................................................................................................... 177
Table 44. Survey respondents’ perceptions of the benefits of DGNs monitoring and evaluating EfS programmes .......................................................................................................................... 179
Table 45. Survey respondents’ perceptions of the most important aspects of culture/values to a DGNs facilitating EfS .................................................................................................................. 189
Table 46. Conclusion Chapter structure ........................................................................ 203
Table 47. Propositional and procedural alignment ......................................................... 214
Table 48. Summary of ENSI’s Milestones ...................................................................... 258
Table 49. Principles and focal areas of ENSI ................................................................ 260
Table 50. Summary of Learnscapes Key Features ......................................................... 269
Table 51. Summary of Quality Criteria in ESD’s Key Features ...................................... 273
Table 52. Summary of CoDeS Key Features .................................................................. 276
Table 53. Summary of SUPPORT’s Key Features ....................................................... 278

List of Appendices
Appendix 1. Three Waves of Sustainability ................................................................... 238
Appendix 2. The Fifteen Currents in Environmental Education .................................... 240
Appendix 3. Organizational Interview Questions and Justifications ............................ 243
Appendix 4. Program Interview Questions ................................................................... 246
Appendix 5. Survey Questions ...................................................................................... 248
Appendix 6. Key Organizational Documents ................................................................. 251
Appendix 7. Phase 1 - Organizational interviews ......................................................... 253
Appendix 8. Leximancer word identification map ......................................................... 254
Appendix 9. Pattern Matching ....................................................................................... 255
Appendix 10. Organizational Case Study ...................................................................... 257
Appendix 11. Key Program Documents ........................................................................ 266
Appendix 12. Phase 2 - Program Interviews ................................................................. 268
Appendix 13. Program Case Studies ............................................................................ 269
Appendix 14. Organizational Survey Questions Analysis aligned to codes .................. 282
Appendix 15. Research Project Information Sheet ..................................................... 285
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGM</td>
<td>Annual General Meeting</td>
</tr>
<tr>
<td>ARIES</td>
<td>Australian Research Institute for Environmental Sustainability</td>
</tr>
<tr>
<td>CERI</td>
<td>Centre for Educational Research and Innovation</td>
</tr>
<tr>
<td>CoP</td>
<td>Communities of Practice</td>
</tr>
<tr>
<td>DGNs</td>
<td>Decentralized Global Networks</td>
</tr>
<tr>
<td>EE</td>
<td>Environmental Education</td>
</tr>
<tr>
<td>EfS</td>
<td>Education for Sustainability</td>
</tr>
<tr>
<td>EfSD</td>
<td>Education for Sustainable Development</td>
</tr>
<tr>
<td>ENSI</td>
<td>Environment and School Initiatives</td>
</tr>
<tr>
<td>ESD</td>
<td>Environmentally Sustainable Development</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>FEE</td>
<td>Foundation for Environmental Education</td>
</tr>
<tr>
<td>GAP-ESD</td>
<td>Global Action Programme on ESD</td>
</tr>
<tr>
<td>GEMF</td>
<td>Global Monitoring and Evaluation Framework</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>IIS</td>
<td>International Implementation Scheme</td>
</tr>
<tr>
<td>INPA/INPO</td>
<td>International Non-Profit Association/Organization</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic and Cooperative Development</td>
</tr>
<tr>
<td>MDG</td>
<td>Millennium Development Goals</td>
</tr>
<tr>
<td>MEF</td>
<td>Monitoring and Evaluation Frameworks</td>
</tr>
<tr>
<td>M&amp;E</td>
<td>Monitoring and Evaluation</td>
</tr>
<tr>
<td>NEM/NRM</td>
<td>Natural Environment/Resource Management</td>
</tr>
<tr>
<td>NFP</td>
<td>Not-For-Profits</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>NPO</td>
<td>Not-Profit Organizations</td>
</tr>
<tr>
<td>SD</td>
<td>Sustainable Development</td>
</tr>
<tr>
<td>SDG</td>
<td>Sustainable Development Goals</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UN-DESDF</td>
<td>United Nations Decade of Education for Sustainable Development</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>UNECE</td>
<td>United Nations Economic Commission for Europe</td>
</tr>
</tbody>
</table>
Statement of Journal Articles Contribution by Others

Michael S. Duggan, Timothy F. Smith and Dana C. Thomsen conceived/designed the methods and contributed materials/tools to the process of analysis used in the research articles. Michael S. Duggan prepared the research questions, refined and applied the research methodology, collected the data, conducted the analysis, and interpreted the results. Michael S. Duggan, Timothy F. Smith and Dana C. Thomsen co-authored the four journal papers that form chapters/sections of this thesis with Michael S. Duggan the primary author of all articles.

Publications arising from this thesis


Duggan, M.S., Smith, T.S. and Thomsen, D.C. (2015). Organizational Approaches to the Facilitation of Education for Sustainability: An Interpretive Case Study. *Sustainability*, 7(6), 7011-7030; doi: [10.3390/su7067011](http://dx.doi.org/10.3390/su7067011) (Chapter 5, Section 5.3.1)


Chapter 1: Introduction
Chapter 1. Introduction

Society, increasingly faced with social, economic and environmental change, is presented with challenges that are testing human resilience. Most recently the importance of these changes has been recognized by the advancement of the Sustainable Development Goals, a newly unfolding platform which considers fundamental the three pillars of sustainability and aims to address this rapidly changing worldwide agenda (UNESCO, 2014). This evolving agenda is characterized by the challenges of intellectuals pushing new intercultural philosophies based on an awareness of diversity and interdependency; theorists who investigate systemic foci of science; social leaders whom promote the creation of subsistence communities and economies; and ecological activists and business people with long-term views oriented toward responsible resource management (Van Peborgh, 2008). The many faces that these challenges take call attention to societies need to address growing complexity and uncertainty which will contribute to the fundamental changes requiring profound societal transformations (Pruneau, 2014). Contemporary literature claims that when we (society) reach a reasonable quality of life (e.g. tipping point), people will begin to demand responses to the challenges confronting them, for example, requiring a healthier, more sustainable world (Hitchcock & Willard, 2009). However, despite the major contributions and ominous signposts identified in the systemic models introduced some years ago by seminal works such as ‘Limits to Growth’, fundamental change of both policy and behaviour aimed at addressing sustainable development have not been taken up at the level or scale required to address sustainability challenges (Meadows, Randers, & Meadows, 2004). Perhaps this is due to a lack of awareness or knowledge, or even to prevailing attitudes of the individual or the community (Meadows et al., 2004). Regardless, the ramification of these concerns and the scale upon which they may generate impacts increasingly affects the educational demands of individuals, organizations and nations, whereby education is progressively considered an investment in the collective future of societies and nations, rather than simply the future success of individuals (Institute for Statistics, 2003).

The escalating recognition of issues and challenges on a global scale accompanied by advances in how we both communicate and address them are significant features of globalization (United Nations, 2003). The world is increasingly being shaped by our cultures, consumption habits, politics, decision making, and economics. Compared to the
world of the past, ‘the sheer volume of events and interactions in the world’s system has risen by orders of magnitude…the international system now generates problems faster than it is creating solutions and the only good response involves an increasing amount of coordination and cooperation’ (Orr, 1992, p. 44). The present state of the world is a product of how people have chosen to interact with it and to some extent society has managed to redirect efforts towards the mediation of people’s relations with the environment (Orr, 1992). However, the increasing scale and pace at which globalization is impacting on the environment has implications for the way we develop initiatives and programs to address change. Specifically, programs that require an effective combination of local and global perspectives as characterized by those delivered during the United Nations Decade of Education for Sustainable Development (UN-DESD) are increasingly required to address impacts across various spatial and temporal scales. Although the UN-DESD has demonstrated progressive approaches to Education for Sustainability (EfS) it is evident there remains uncertainty in the actual facilitation of the transition from awareness to empowerment and action:

Whether education as a whole can be bold enough to develop an adequate response, on a scale commensurate with the issues that have to be addressed…remains a crucial question (Sterling, 1992a, p. 24).

Sterling’s comments were presented in the early 1990’s prior to the commencement of the UN-DESD in 2005. Regrettably, to some extent they remain applicable. The argument he presented was that ‘issues that surround us are fundamentally systemic’ and, therefore, ‘we need to think and learn systemically’ (Sterling, 2003, p. 40). It is expected that initiatives which intend on applying educational approaches to address sustainability challenges in the future will depend upon an understanding of social, economic and environmental systems identified through facilitation and monitoring (Foster, 2001).

The literature on globalization to date has focused on the formation of new centres of power, other than those that are considered centralized. These less centralized centres are increasingly affecting the direction and pace of change in the world, caused in part by the integration of broad processes of systemic thinking (Suter, 2003; Weyler, 2004). One such emerging trend has been the practice of using Decentralized Global Networks (DGNs) to develop and operate EfS programs. This tendency is likely to proliferate as the opportunities presented by Information Communication Technologies (Benedict, 1999) including promising approaches such as e-learning, continue to improve, and the further benefits of diverse and global perspectives are realized (UNESCO, 2014). DGNs can
themselves be seen as a product of globalization, emerging from a reduction or removal of barriers between national borders, organizations, and people, which encourages information generation within and between wide-ranging networks. They are neither profit-making nor instruments of government and represent an emerging mechanism for linking local and global scales through approaches that address drivers of social, economic and political change (Davies, 2008). For example, Greenpeace International is a systemized and decentralised global network, which represents an idea, as opposed to a centralized group of people as in the case of, for example, the nation-state (e.g. Australia).

Essential to an international organization such as Greenpeace is the integral role it plays as an interface between nature and society, thereby creating a centre of power beyond the space in which centralised governments operate (Weyler, 2004). The wide-ranging impact an organization such as Greenpeace makes through its education-oriented, global networks stems from its application of the principal of networked systems leveraging an increased educational investment.

Regardless of the impact of decentralized networks, what is apparent in the literature is that there is little documented evidence of the dimensions of DGNs and the approaches they favour, or of the challenges and opportunities afforded by the expansion or contraction of DGNs. Also of relevance is the fact that there remains little understanding of the scales at which these networks must operate in order to facilitate EfS, or the dimensions, which characterize their delivery. With an increased recognition at the international level of EfS as a mechanism to progress for sustainable development, and the proliferation of countries committing to work at a local, national and international policy level, it leaves little doubt that global networks will be required to address sustainability issues and agendas more broadly (Buckler & Creech, 2014). This research examined the organizational and program-specific models presented by DGNs, and addressed the research gap existing in the current study of EfS, specifically the issues relating to the notion of scale and its effect upon the implementation of EfS more generally.

1.1 Research context and rationale

At the World Conference on Sustainable Development in Johannesburg in 2002 the UN General Assembly, in conjunction with the United Nations Educational, Scientific and Cultural Organization (UNESCO), introduced the United Nations Decade of Education for Sustainable Development (UN-DESD) to be delivered from 2005 to 2014.
The UN-DESD was a global call to all countries to strengthen their contribution to sustainable development through a focus on education and as a means to build understanding of, and practical training for, EfS. The United Nations (UN) recognized the requirement for a:

[V]ehicle for promoting education for sustainable development (EfSD) within all areas of learning. Recognizing that education is vital in the transition to sustainability (Tilbury, 2007, p. 240).

The global vision for the UN-DESD was driven by the objectives of the United Nations Economic Commission for Europe (UNECE, 2005) which included:

- Enabling networking, linkages, exchange and interaction among participants in ESD;
- Encouraging an increased quality of teaching and learning in ESD;
- Assisting countries to progress towards and attain the Millennium Development Goals through ESD efforts; and,
- Providing countries with opportunities to incorporate ESD into education transformation efforts (UNESCO, 2005a).

The vision conceived by the UN-DESD was in providing countries with guiding principles for educational design and supporting learning opportunities that would: i) engage people of all backgrounds in an ongoing process of learning; ii) enable people to develop new understandings of sustainability as well as make decisions and take actions that have positive impacts upon sustainability; iii) promote and achieve system-wide change; iv) embed lasting change across social, economic and ecological systems; and, v) support the implementation of ecologically sustainable development (ESD) at all levels. Emergent from these five principles was the identification of four major thrusts (Table 1) of EfS to be enacted throughout the UN-DESD.

Table 1. Major thrusts throughout the UN-DESD

<table>
<thead>
<tr>
<th>Thrust</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promoting and improving quality education</td>
<td>Basic education needs to focus on sharing knowledge, skills, values and perspectives throughout a lifetime of learning in such a way that it encourages sustainable livelihoods and supports citizens to live sustainable lives.</td>
</tr>
</tbody>
</table>
Table 1. Continued.

<table>
<thead>
<tr>
<th>Thrust</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reorienting educational</td>
<td>Rethinking and revising education from nursery school through university to include a clear focus on the development of knowledge, skills,</td>
</tr>
<tr>
<td>programs</td>
<td>perspectives and values related to sustainability is important to current and future societies.</td>
</tr>
<tr>
<td>Building public understanding</td>
<td>Achieving the goals of sustainable development requires widespread community education and a responsible media committed to encouraging an informed and active citizenry.</td>
</tr>
<tr>
<td>and awareness</td>
<td></td>
</tr>
<tr>
<td>Providing practical training</td>
<td>All sectors of the workforce can contribute to local, regional and national sustainability. Business and industry are, therefore, key sites for on-going vocational and professional training, so that all sectors of the workforce can have the knowledge and skills necessary to make decisions and perform their work in a sustainable manner.</td>
</tr>
</tbody>
</table>

(UNESCO, 2007)

Supporting sustainability through education, the UN-DESĐ aimed to ‘…engage new and current stakeholders in all the different levels and contexts to create awareness and participation in environmentally sustainable development’ (Mula & Tilbury, 2009, p. 91). As many stakeholders will already be active contributors to the UN-DESĐ goals—the challenge will be to involve those with significant influence that are less aware of such issues (Mula & Tilbury, 2009).

Succeeding and building on the Decade, UNESCO developed a Global Action Programme on ESD (GAP-ESD), which was endorsed by the UNESCO General Conference in 2013 and was launched in Nagoya, Japan in November 2014. The new Program takes aim at scaling up action in ESD in order to accelerate overall progress towards sustainable development, and marks an important contribution to the global post-2015 sustainable development agenda (Buckler & Creech, 2014). Priority action areas (Table 2) of the GAP-ESD and UN-DESĐ objectives of note include:
<table>
<thead>
<tr>
<th>UN-DESD Objectives addressed</th>
<th>GAP-ESD Action Areas addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide opportunities for reflection and learning;</td>
<td>Mainstreaming ESD into both education and sustainable development policy;</td>
</tr>
<tr>
<td>Monitor and evaluate progress across a range of sectors; and</td>
<td>Building capacities for educators and trainers to more effectively deliver ESD; and</td>
</tr>
<tr>
<td>Assess changes in context and structures; processes and learning; as well as outcomes and impacts.</td>
<td>Scaling up ESD programmes and multi-stakeholder ESD networks</td>
</tr>
</tbody>
</table>

(adapted from Tilbury, 2009 and Buckler & Creech, 2014)

The UN-DESD and more recently a post- UN-DESD agenda provide examples of the most extensive, international EfS initiatives to date (Buckler & Creech, 2014). They rely heavily on both a global and decentralized powerbase to deliver their objectives (UNESCO, 2007). The development and facilitation of EfS programs through global networks/organizations before and during the UN-DESD had been wide-ranging and delivered across geographically and organizationally diverse scales. The differing spatial and temporal scales embedded within the process of facilitating EfS increased the complexity with which the groups had to approach the facilitation process. Given that the UN-DESD was an international initiative, the theoretical framework developed in this research is consistent with current and emerging national and international sustainability drivers contributed by the UN-DESD. For example, in Australia the scaling out (i.e. geographically) of effective EfS programs has been endorsed as an imperative in all states and territories and is guided by National Action Plans including ‘Educating for a Sustainable Future’ (DEH, 2005), and ‘Education for Sustainable Development’ (DEWHA, 2009) - the latter having been developed to supersede the preceding document. From an international perspective the Millennium Development Goals (MDG) identified promoting education and environmental sustainability as integral to achieving the MDG plan and realising the quantitative targets set for the year 2015 (Sachs & McArthur, 2005). The ‘scale-up’ of interventions and policies required to meet the MDGs were indicated as requiring organizations to make long-term investments in management systems, training and retention of human resources, and infrastructure (Sachs & McArthur, 2005). These objectives may assist organizations to realize that a combination of economic and developmental motives makes good justification for scaling up programs.
The author commenced this research at a time (i.e. 2008) when the MDGs were well-into their delivery cycle and the UN-DESD was still in the first half of a ten year delivery program. The monitoring and evaluation (M&E) research specific to the progress of the UN-DESD had only just begun to be published at this time (see for example; Mula & Tilbury, 2009; Tilbury, 2007; Tilbury & Janousek, 2006; Wals, 2009). A specific concept within the M&E research highlighted the need to identify the strategies that could lead to improved conditions for the facilitation of EfS (Wals, 2009). In conjunction with this was the key thrust of the UN-DESD to improve quality education through the development of widespread knowledge, skills, values and perspectives of and for sustainable development. Combining and examining further these concepts this research is consistent with the strategies and objectives detailed by the UN-DESD including compliance with the International Implementation Scheme (IIS) and the GAP-ESD. A central objective of this research was the provision of a theoretical contribution to informing future directions for EfS programs and initiatives, in recognition of the importance placed on this area of study and the concerns expressed as the UN-DESD concludes and the GAP-ESD commences (Buckler & Creech, 2014; UNESCO, 2014).

1.2 Research significance

The facilitation of effective EfS is influenced by current and emerging national and international sustainability drivers, which are themselves swayed by the interplay between varying geographical, organizational, and culture-value scales. The relationship amongst these scales is apparent where actions taken at one scale result in the recognition of impacts at another scale, and where these ‘impacts’ are characterized by simultaneously generated, and interdependent challenges and opportunities. Scalability is a multi-tiered and participatory process and involves expanding impact and enhancing organizational and program sustainability and not just becoming larger in size or geographical reach (Uvin, 1995). Identifying the complex systems at play within and amongst these varying scales is particularly significant to diagnosing and applying appropriate strategies when approaching the implementation of EfS initiatives at the macro (i.e. global) and micro (i.e. local) scales. Indeed, the focus of this research is multi-dimensional examining the dimensions characteristic of a DGNs facilitating effective EfS at both the organizational and program levels. The study of the organization relates to the strategic, governance and administrative dimensions of EfS facilitation, whereas, the programs delivered by the organization are the means through which strategy is
operationalized. This study examines the facilitation of EfS by DGNs through the application of a multi-scale, nested approach which accounts for the different spatial and temporal scales in which a DGNs operates.

Pivotal to this study is the objective of applying a theoretical framework that offers an appropriate basis for examining the effective facilitation of EfS by DGNs cognizant of both the challenges and opportunities facing these organizations and the programs they deliver. Currently, there is limited literature in existence examining how DGNs operate as global organizations and how they facilitate EfS across scales; for example, scaling up from local to international programs/initiatives. ‘Scaling up research has been tenuous because attempts at scaling up are primarily initiated with development goals, rather than with research goals, revealing the separate worlds of research and development’ (Catacutan, 2005, p. 2). The lack of research into scalability of sustainability, sustainable development and education is considered problematic and is in part influenced by the traditional view that: i) dissemination and scaling up is devoid of research; and ii) it is free from the responsibility of pure development and extension organizations. This erroneous belief reflects and perpetuates the now visible gap between research into the links between sustainability, sustainable development and scalability. However, if we are to close this gap within research and the institutions which facilitate sustainability, an examination of scalability should be high on the agenda (Catacutan, 2005). The intent in this thesis is to expand upon the perceived gap, examining through the theoretical lens of scalability EfS programs and the organizations that deliver them. The knowledgebase generated from additional research regarding scalability would make a ‘contribution to the further scale up of the impacts of appropriate technologies, programs or strategies’ for sustainable development (Catacutan, 2005, p. 2).

Mindful of the recent imperatives and drivers, the ensuing theoretical framework seeks to acknowledge and offer a solution to rectify the gap existing between knowledge (i.e. research) and behaviour (i.e. practice) still apparent in research examining the scalability of EfS projects. Use of analogies such as scaling up as it relates to educational programs, ‘conjure images of mass production of a tangible product so one can go from a local to a regional or a national market, creating illusions about the nature of the processes necessary’ (Elias, Zins, Graczyk, & Weissberg, 2003, p. 304). The widespread implementation of effective EfS programs require ‘thoughtful realism’ about how scaling programs up and/or out can be ‘important, difficult, and possible’ (Elias et al., 2003, p. 304). An examination of literature relevant to the subject (for example, Catacutan, 2005;
Coburn, 2003; Uvin, 1995) reveals that significant questions around scaling EfS organizations and their programs have not yet been fully addressed. The theoretical framework developed in this research seeks to address this gap in the literature and make explicit the integral part that addressing the challenges and opportunities to EfS facilitation plays in effective organizational and program delivery.

In conclusion, the thesis contributes to the understanding of frameworks for effective EfS facilitation, the debate centred on efficient and effective EfS program delivery, and the concept of scalability in organizational governance and program implementation. In regards to scale, the research addresses a construct that when examined in the context of educational facilitation has predominantly been uni-dimensional, examining scale only from an expansionary or geographical perspective, for example, the number of schools that could be reached by a certain project, and not through a multi-scale approach as will be applied in this research (Coburn, 2003). Formulating answers to the research questions presented in the sections below assist in the identification and better understanding of the stages that DGNs progress through during their life cycle, and address the implications of scale upon the challenges and opportunities that they inevitably encounter along the way. Concurrently, this analysis offers a theoretical framework that when applied makes explicit the key characteristics and dimensions associated with the efficient and effective facilitation of EfS. Finally, the research addresses the existing research gap associated with the scaling up, scaling out, and scaling in of EfS programs. The assumption here is that scalability involves sharing something that is effective (e.g. programs, practices, or ideas), thereby enabling more people to experience its benefits. Observably, when something works well the natural inclination is to share it.

1.3 Research problem and questions

Basing research upon a well-articulated, well-supported, and well-argued problem establishes the potential for producing meaningful research results (Ellis & Levy, 2008). With such focus in mind the author has narrowed the scope of the research problem from what commenced as a much broader investigation of EfS to an examination of the facilitation of effective EfS by a DGNs. The underlying impacts of scale upon the organizational and program levels of a DGNs are investigated and the theoretical concept
of a global, nested and multi-scale framework became the lens through which the research was examined.

The primary objective of the research, then, was to examine through a content analysis and an interpretive case study approach a DGNs, its programs, the dimensions through which it facilitates EfS, and the challenges and opportunities it faces. Table 3 identifies the study’s three research questions and outlines the associated research phases that provide structure for the delivery of this study.

**Table 3. Research Phases and Questions**

<table>
<thead>
<tr>
<th>Research Phases</th>
<th>Research Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Analysis</td>
<td>How does a Decentralized Global Network facilitate EfS at a macro (i.e. organizational) level?</td>
</tr>
<tr>
<td>Program Analysis</td>
<td>How does a Decentralized Global Network facilitate EfS at a micro (i.e. program) level?</td>
</tr>
<tr>
<td>Synthesis of Phase 1 and 2 findings</td>
<td>What are the challenges and opportunities facing a Decentralized Global Network in the facilitation of effective EfS?</td>
</tr>
</tbody>
</table>

Examining the three research questions through the theoretical frame of scalability (i.e. scaling up, scaling out, and scaling in) contributes to the articulation of research findings and improves understanding of what dimensions contribute to effective facilitation of EfS more generally.

**1.4 Thesis Outline**

The thesis is presented in six chapters, each of which is tasked respectfully with building and/or expanding upon the development of the theoretical framework emerging through this research (Table 4). To align with previously published works, or works currently submitted for publication review, the thesis has developed, in part, from the author’s journal articles and conference papers (refer to Publications Arising from this Thesis). These publications have formed the framework upon which the theoretical framework is developed and the findings are articulated.
Table 4. Thesis Outline

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction</td>
<td>An introduction to the research rationale and context including the identification of the thesis problem and questions, and an argument for the relevance and importance of the study.</td>
</tr>
<tr>
<td>2.</td>
<td>Literature Review</td>
<td>A detailed examination of the key literature relating to the research problem and questions.</td>
</tr>
<tr>
<td>3.</td>
<td>Scalability</td>
<td>Identification of the formation of DGNs as organizations that facilitate EfS; and, an introduction to the multi-scale nested approach, the theoretical lens through which the research is undertaken.</td>
</tr>
<tr>
<td>4.</td>
<td>Research Design</td>
<td>A clear articulation of the theoretical framework and explanation of the methodology and methods. Also includes a discussion of research ethics and rigor.</td>
</tr>
<tr>
<td>5.</td>
<td>Results and Discussion</td>
<td>A presentation of the findings generated through the research phases addressing the three research questions and including analysis and synthesis. These findings are presented in the form of three journal articles.</td>
</tr>
<tr>
<td>6.</td>
<td>Conclusions and Theoretical Implications</td>
<td>A conclusion highlighting the theoretical implications of the research and addressing opportunities for future research.</td>
</tr>
</tbody>
</table>

Chapter one introduces the key drivers for the research, and identifies the research context and rationale incorporating the identification of key research questions, aims, and objectives. In addition, chapter one focuses on the significance and innovation of the research, pinpointing explicit research gaps to be expanded upon in the literature review. Chapter two examines the key literature including the impact of worldviews, ethics and sustainability discourse upon understandings of EfS and the context in which it is facilitated. The literature review provides the theoretical platform upon which this research was constructed. This Chapter also provides context that supports the research, and identifies for the researcher where this study addresses significant gaps, in the current literature as identified by the author. Chapter three consists of a published journal article, *Scaling Sustainability Learning: Size and Scope Matter*, the first in a series of four articles.
whose contents comprise the bulk of this thesis. The chapter examines the concept of a multi-scale, nested framework (‘scalability’) and its impact upon the facilitation of EfS. Chapter four clearly articulates the research design for this project including the impact of the researcher’s philosophical position upon the research. In addition, this chapter identifies the theoretical framework underpinning the research, and the methodology, methods, and data analysis tools applied throughout. Chapter five consists of three journal articles currently published or undergoing editorial and external review; 1) *Organizational Approaches to the Facilitation of Education for Sustainability: An interpretive Case Study*; 2) *Dimensions of effective Education for Sustainability: A comparative analysis of four programs*; and, 3) *Challenges and Opportunities to facilitating effective Education for Sustainability: A synthesis of organizational and programme dimensions*. Together, these articles present the findings resulting from the analysis of the first and second phases of data collection and synthesis of these findings. In addition, this chapter provides the detailed analysis of key challenges and opportunities recognized as essential to the effective facilitation of EfS identified in phase one and two of the research. Chapter six presents a conclusion highlighting the examination of the current practice of DGNs facilitating EfS. It recognizes the potential implications of applying a monitoring and evaluation framework, informed by the theoretical frame and data analysis/interpretation, to make sense of the success, or lack thereof, of EfS program delivery and organizational governance. In addition, this final chapter presents an overview of any potential implications the adoption and/or further examination of these findings may have on any future research efforts.

The final sections of the manuscript contain a collection of appendices, which present information and data in support of the six chapters. The process of developing case studies through content analysis, interviews and a survey yielded significant data, which was able to be applied to a detailed examination of a DGNs facilitation of EfS at varying scales. Appendices 10 and 13 are highlighted as they provide in-depth case study analysis which subsequently formed the basis for the DGNs organizational case study, four program case studies and a comparative analysis of these programs. These case studies are referenced throughout the presentation of the results in Chapter five.
Chapter 2: Literature Review
Chapter 2. Literature Review

2.1 Introduction

UNESCO’s early recognition of education as an important tool for realizing sustainability was supported by the acknowledgement that awareness and training in environmental education was integral to our society (Tilbury, Stevenson, Fien, Schreuder, & Huckle, 2002). The integral part Environmental Education (EE) was to play in the sustainability agenda was recognized in 1977 when UNESCO met in Tbilisi to conduct the Intergovernmental Conference on Environmental Education. It was here, in a former part of the USSR, that dignitaries signed the Tbilisi Declaration on Environmental Education (UNESCO, 1978). At this conference it was clearly established that the role education would play in solving environmental problems was a crucial one. Participants considered EE as a systemic and central component of formal education at all levels and a necessary tool to ensure the provision of knowledge, understanding, values and skills needed to address solutions to environmental challenges (UNESCO, 1978). Developing environmental intelligence through environmental education was identified in the ‘Tbilisi Declaration’ as essential to assisting social groups and individuals to make connections with the environment, and is articulated through the following five key functions of Environmental Education (Table 5).

**Table 5. Functions of Environmental Education**

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness</td>
<td>Acquire an awareness and sensitivity to the total environment and its allied problems.</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.</td>
</tr>
<tr>
<td>Skills</td>
<td>Acquire the skills for identifying and solving environmental problems.</td>
</tr>
<tr>
<td>Participation</td>
<td>Provide an opportunity to be actively involved at all levels in working toward resolution of environmental problems.</td>
</tr>
</tbody>
</table>

(UNESCO, 1978)
UNESCO’s recognition of the five functions of EE as key components of sustainable development and sustainability has not wavered and continues to guide the debate post-Tbilisi. The approaches have, however, evolved through a gradual transition from various forms of EE (i.e. in-, about- and for; Fien, 1993) to Education for Sustainable Development (EfSD), and indeed EfS (McKeown & Hopkins, 2005). The process of recognizing the importance of, and need for, EfS has since notably been marked by other historically important documents and conferences such as the Earth Summit in 1992 which resulted in Agenda 21, a guiding document focusing upon the reorientation of education towards ESD (McKeown & Hopkins, 2003; Wade, 2008); and, the World Conference on Sustainable Development in 2002 which reflected upon the key thrusts of EE and ESD and whose work was introductory to the commencement of the UN-DESD in 2005 (Hopkins, 2012). It is recognizably so that at the conclusion of the UN-DESD, and 40 years post Tbilisi, the focus still remains prominently upon the importance of the original functions of EE including society’s development of knowledge, skills and perspectives on sustainability and learning (Buckler & Creech, 2014).

The use of the term EfS, in contrast to EE and EfSD, will be prominent throughout this research. The author uses EfS as opposed to EE or EfSD as the term is considered more conducive to a truly interdisciplinary and reflexive approach to the facilitation of education (Foster, 2001). In addition, the years in progression from Tbilisi, and the previous Belgrade Charter for that matter, leading to the Earth Summit have witnessed an expanding concern beyond the environment to anthropocentric concepts of economic and social development (McKeown & Hopkins, 2007). EfS is an approach that focusses on the nesting of social, economic and environmental ideologies and ideas whilst encouraging reflection and action for sustainability (Huckle & Sterling, 1997). In the sections to follow the author explores the progression from EE through to EfS, including identifying the contribution that the concepts of environmental ethics, sustainable development, sustainability learning and scalability have made to both EfS generally and this research’s theoretical model. These concepts have been at the fore of the evolution of environmental education, are integral to developing an understanding of the shifting dynamic of education, and address the complex and highly contextual nature of sustainability and its connection to education. In addition to these core concepts, the author describes networks and DGNs in more detail. Finally, monitoring and evaluation frameworks are examined as a means to demonstrate progression towards, for example,
educational objectives implicit within UNESCO’s five functions of EE and their evolution to the ‘Roadmap’ currently proposed to drive the development of EfS in the years beyond the UN-DESD (UNESCO, 2014).

The author was cognizant of the need to address the above-mentioned concepts as components of the broader debate regarding sustainability more generally, and the quality criteria and dimensions necessary to realize effective EfS (Mayer, 2006). To this end, the Chapter offers a broad investigation of the above-mentioned key concepts and culminates in the construction of a theoretical model (i.e. scalability) which was subsequently applied to the analysis of a DGNs and the delivery of EfS programs. The concept of scalability was the lens through which the author assessed the facilitation by DGNs of effective EfS.

2.2 Worldviews, Ethics and Understanding Environmental and Sustainability Discourse

The literature review begins by delving into an understanding of the central role worldviews and environmental ethics play in constructing the links between environmental awareness, the development of environmental attitudes and the educational initiatives required to address the broader concept of sustainability. Notionally, ‘worldviews, environmental values and ethics are human social psychological constructs informed by people’s inner experiences and their personal reasoning’ (Smith, Pero, & Smith, 2010, p. 1). Values are predominantly shaped by a person’s worldviews and are informed by his or hers broader social experiences. Values are a representation of an individual’s judgement about what is valuable or important based on his or her principles or standards; worldviews, on the other hand, are the framework through which people interpret experiences and make meaning from them (Smith et al., 2010). Dominant worldviews can work to shape ethical stances in regards to the environment, education and sustainability (Sterling, 1993). Ethical stances are not ‘totally exclusive’ encapsulating ‘sub-paradigms of values and, beliefs and ideas that fall within each overall framework’ (Sterling, 1993, p. 69). For example, Sterling advocated that there is a need for a stronger connection between the terms sustainable and development to eventuate a fundamental social change (Sterling, 1993). Initially, both environmental philosophy and ethics must toil together to answer the question ‘what is the connection between ethics and sustainable development’ (Spash, 1993, pp. 117-118).

However, there has been ‘limited cross-fertilisation of the ideas between fields’ and the principles that are employed in the pursuit of a solution are too utilitarian to do the
debate any sort of justice. Worldviews have been neatly packaged by functional understanding of ethical beliefs to try to explain people’s awareness of and attitudes towards the environment. For example, dominant worldviews often occupy disparate ends of the spectrum in how they approach the concept of sustainability. Mechanistic/reductionist (Cotgrove, 1982) and systemic/holistic (Milbrath, 1989) worldviews are oft times considered polar opposites as is further illustrated in the three dominant approaches identified in Table 6.

Table 6. Worldviews and environmental approaches.

<table>
<thead>
<tr>
<th>Worldview</th>
<th>Planetary Management</th>
<th>Stewardship</th>
<th>Environmental Wisdom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach</td>
<td>Humans are apart from the rest of nature and can manage nature to meet our increasing needs and wants (reductionist). As a result of humans’ ingenuity and technology, people will not run out of resources (mechanistic). The potential for economic growth is essentially unlimited. Human’s success depends on how well people manage the earth’s life support systems mostly for people’s own benefit.</td>
<td>Humans have an ethical responsibility to be caring managers, or stewards, of the earth. Humans will probably not run out of resources, but they should not be wasted. Humans should encourage environmentally beneficial forms of economic growth and discourage environmentally harmful forms. Human’s success depends on how well people manage the earth’s life support systems for our benefit and for the rest of nature.</td>
<td>Humans are a part of and totally dependent on nature and nature exists for all species (holistic). Resources are limited and should not be wasted. Humans should encourage earth-sustaining forms of economic growth and discourage earth degrading forms. Humans’ success depends on learning how nature sustains itself and integrating such lessons from nature into the ways we think and act (systemic).</td>
</tr>
</tbody>
</table>

(adapted from Miller & Spoolman, 2009)

An individual subscribing to a planetary management worldview would likely identify economic development and exploiting the environment as an acceptable approach, whereas, an individual focussing upon environmental wisdom would more likely
advocate for limitations upon development and boundary measures being placed upon the environment. Miller (2009) notes that, ‘people with widely differing environmental worldviews can take the same data, be logically consistent, and arrive at quite different conclusions because they start with different assumptions, and moral, ethical, or religious beliefs’ (Miller & Spoolman, 2009, p. 20). Recognition of this divisiveness in perspective makes defining environmental education and sustainability difficult and highly contextual at best.

The environmental and sustainability education journey from its origins to the present has meant that new ideas and concepts necessitated a new vocabulary in which to articulate the ideas (Wade, 2008). To better understand the diverse conceptual understandings in existence it may assist to examine the dominant discourses from the perspective of three common theoretical approaches to navigating sustainability challenges (Table 7). Discourses are understood as shared ways of understanding the world (Dryzek, 1997; 1998). They are stories, built from specific kinds of structural elements and are defined by four structural features: 1) basic entities whose existence is recognized or constructed; 2) assumptions about natural relationships; 3) agents and their motives; and, 4) key metaphors and other rhetorical devices.

Table 7. Contrasting discourse underlying alternative approaches to sustainability

<table>
<thead>
<tr>
<th>Theoretical Approaches</th>
<th>Administrative Rationalism (i.e. leave it to the experts)</th>
<th>Democratic Pragmatism (i.e. leave it to the people)</th>
<th>Economic Rationalism (i.e. leave it to the market)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses and Mechanisms</td>
<td>• Professional resource management bureaucracies</td>
<td>• Skepticism towards governments and “experts”</td>
<td>• Can be defined as “a commitment to the free market mechanisms to achieve public ends”.</td>
</tr>
<tr>
<td></td>
<td>• Pollution control agencies</td>
<td>• Values citizen participation which is consultative and democratic</td>
<td>• Denies the existence of “nature” and sees everything in terms of “market economics”.</td>
</tr>
<tr>
<td></td>
<td>• Regulatory policy instruments</td>
<td>• Public consultation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Environmental impact assessments</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 7. Continued.

<table>
<thead>
<tr>
<th>Theoretical Approaches</th>
<th>Administrative Rationalism</th>
<th>Democratic Pragmatism</th>
<th>Economic Rationalism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses and Mechanisms</td>
<td>• Expert advisory commissions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Cost-benefit analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Risk assessment (or “alternatives assessment”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Administrative rationalism in action- politics and lobby groups.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Dispute resolution</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Public inquiries</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Right to know legislation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Role of NGOs and lobbyists</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Some principles of economic rationalism:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Privatize everything you can.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Corporatize and develop what you cannot privatize</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Use strategies such as tradable quotas and green taxes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o The current dominant ideology in Western countries such as Australia, the UK, the USA and New Zealand.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Dryzek, 1998)

By way of example, in Australia, the dominant political ideology is that of economic rationalism (Pusey, 1991; Wright, 2003). This approach plays a strong role in defining sustainability, development and the subsequent delivery of EoS. For example, there has been a shift in sustainability and sustainable development ‘away from a state-centred or business-centred economic system, towards a more people-centred system’ (Robertson, 2005, p. 2). If economic rationalism is to continue to dominate Australian ideology and sustainability is to shift towards democratic pragmatism there requires a significant structural change in how Australia views development and learning. To address this, McManus ‘calls for a reorientation of the debate in order to focus on sustainability itself as a possible means to move towards sustainable development’ (McManus, 1996, p. 69). For a successful reorientation to occur it appears that, at the very least, there is a requirement for a common and accepted language framing the concepts of sustainability and sustainable development to be adopted.

To date, the declaration of a ‘common language’ has been elusive. Disparate worldviews and ethics make it challenging to identify a common set of environmental values and a language in which to use or to describe them (Dryzek, 1997). As such, sustainability, not unlike ‘liberty, justice, and democracy’, has no single and agreed
meaning. Some argue it adopts new meaning within different ideologies and programmes underpinned by different kinds of worldviews and knowledge (Huckle & Sterling, 1997, p. 3). Despite challenges, the concept of ‘Sustainability’ has now achieved wide ‘purchase’ in many fields, from environmental and social justice activism; to government and the corporate sector (Partridge, 2005). In the disciplines of, for example, building biology and ecological architecture sustainability is defined as a continuous growth and an evolution cycle often referred to as ‘cradle to cradle’ (McDonough & Braungart, 2002a, 2002b). The concept of sustainability is engaging and has ‘captured our imaginations and aspirations’. However, as a ‘tangible and identifiable goal it has eluded us’ (Fricker, 1998, p. 1), perhaps, with good reason. One could argue that the view of sustainability as a ‘goal’, or an end in itself, is applying a narrow and anthropocentric approach to a concept that is in and of itself grounded in the process and not the resolute outcomes (Tàbara & Pahl-Wostl, 2007).

Sustainability is a concept with many different definitions which often share common principles (Montiel, 2008; Perey, 2014). When considering how to effectively facilitate education that addresses sustainability, it is well worth addressing these numerous descriptions of the term sustainability in general. Outlining its various definitions provides an understanding of the contextual nature of the term. A review of the prevailing literature reinforces this. There is a montage of references presented by a number of authors referring to sustainability (Matthews, Garlick, & Smith, 2009): as an ethical or moral position (Martens, Slooff, & Jackson, 1997); a living process or state of existence (McMichael & Woodruff, 2002); a pragmatic approach to the use of water, energy and raw materials (Torgerson, 1994); the quality of economic growth and development (Brundtland, 1987); a new phase in environmental awareness (Institute for Statistics, 2003); a set of strategic imperatives (Brundtland, 1987; DEH, 2005); and skills, knowledge and values promoting social change (Smith et al., 2010). Consequently, due to its many definitions, it is almost commonplace in the literature on sustainability to deplore the vague or ill-defined character of the concept (Becker & Ostrom, 1995; Partridge, 2005).

Thus, the only consensus on sustainability appears to be that there is no shared understanding or common language framing the concept. Due to the above-mentioned highly contextual nature of the concept, this examination should not be taken as a complete picture of the interrelationships between the constructs of sustainability,
sustainable development, ethics, education and learning. It is an attempt to connect these concepts inclusive of many fragments of a picture for what is an increasingly complex, convoluted, and, often, mis-contextualized concept (Brown, Hanson, Liverman, & Merideth Jr, 1987). As is discussed in ensuing sections transitioning from EE to EfSD and EfS has required connecting the constructs of education and development with that of sustainability, which has most assuredly led to an increase in the complexity associated with the subject.

2.3 From About to In to For: The Waves of Education for Sustainability

Examination of the contemporary theoretical approaches that impact upon the core constructs linking sustainability to environmental education, EfSD and EfS demonstrate that it is an ‘ill-defined concept that can be approached from various perspectives’ (Hesselink, van Kempen, & Wals, 2000, p. 2). The concept has many meanings, is used broadly and is highly contextual, and the differing paradigms (e.g. educational perspectives and sustainability perspectives) increase complexity making it difficult to reconcile. Furthermore, when these difficulties are not addressed they can have deleterious effect upon the capability of organizations to deliver effective EfS programs (Wheeler, Hesselink, & Pretorius, 2005).

It is easiest to start with an understanding of environmental education and its evolution. ‘Over the past 30 years, environmental education, possibly more than any other form of education, has undergone the greatest progression, not only in terms of its goals, theory, and principles but also in its very pedagogy’ (Clover, 2000, p. 213). In the late 1980’s and early 1990’s, the concepts of sustainable development and the role that environmental education can play in the necessary transformation towards a sustainable society were clearly differentiated and inexplicitly devoid of well-established links (Fien, 1993b). Decisively, Fien identified environmental education as developing a ‘respect, indeed reverence, for the earth through the detailed understanding and appreciation of…how nature maintains the conditions necessary for life’ (Fien, 1993b, p. 39). However, as the 1990’s progressed, a mounting concern for growing environment and development problems generated wider support for an educational approach to the immediate concerns surrounding the environment and educating for sustainability in the long term (Tilbury, 1995). By way of example, in Australia the concepts that encapsulate sustainability have significantly progressed from those fixed in the origins of environmental education in the
Environmental education has evolved from awareness of the natural environment and its degradation to, as indicated by UNESCO at Tbilisi, equipping all people with the knowledge, skills and understanding necessary to make decisions based upon a consideration of their full environmental, social, and economic implications (DEWHA, 2009). The crucial task along the journey has been ‘not trying to make the actual changes in society, but building the public awareness and support that has to be there before any significant changes becomes possible’ (Fien, 1993b, p. 19).

Ultimately fixed views of environmental education as the process and ‘sustainability’ as the ultimate goal are in stark contrast to the perspective that sustainability is a developmental process itself, a ‘work in progress’ that influences perceptions and approaches to education. Chronicling three evolutionary ‘waves of sustainability’ (Appendix one) beginning in the 1960’s and ending in the late 2000’s (Elkington, 1997; Van Peborgh, 2008) provides context for the development of events that have framed the progression towards EfS throughout the past four decades and these events have shaped the evolving concept of EfS, from: education about the environment; to education in the environment; to education for environmental sustainability (Fien, 1993b; Huckle & Sterling, 1997; Robottom & Hart, 1993). Throughout the first wave, awareness about the prominent and growing environmental challenges of our time gave rise to international organizations such as Greenpeace and the proliferation of defining publications, for example, The Limits of Growth (Meadows, Meadows, Randers, & Behrens III, 1974). The second wave hailed the adoption of green messages and growth of activity in environmental action and mitigation. The 1980s were important years for environmental education, in that it was a decade in which public environmental concern continued to heighten, giving environmental education a stronger impetus in schools (Ferreira, Ryan, & Tilbury, 2006; Fien, 1993b). The third wave has revealed yet another change in direction encompassing a participative and global movement grasping the realisation that the environment is at the core of everything and that at minimum our development goals require a re-orientation towards a more sustainable future. EfS acknowledges that action with the intention of supporting a sustainable and resilient course is requisite for continued quality of life and survival of future generations. This focus upon education for sustainability addresses and seeks balance amongst the set of complex social, economic, environmental and governance dimensions that comprise the world in which we live (Combes, 2005).
An understanding of the philosophical dimensions which shape the environmental education agenda assist in clarifying where the concept of EfS has originated (Foster, 2001). As indicated, the mounting concern for the environment was recognised in the 1990’s and subsequently lent itself to generating a greater support for a long term educational approach that differed significantly from the naturalist and scientific work carried out under the premise of encompassing environmental education in the preceding decades (Fien, 1993a; Tilbury, 1995). This way of thinking of environmental education has evolved again in recent years to encapsulate holistic, value-laden, and action-oriented approaches designed to elicit increasingly sustainable outcomes. The guiding philosophies here defined have their roots in environmental education and were formed from the science of Natural Environment Management (NEM). EE utilized learnings from NEM to identify where EE dominant philosophises fit amongst the types of environmental science (Table 8).

Table 8. Three dominant philosophies of environmental education

<table>
<thead>
<tr>
<th>Type of Science</th>
<th>Philosophical Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Empirical Sciences</strong> (Positivist, observational knowledge)</td>
<td>Human Interests Served</td>
</tr>
<tr>
<td></td>
<td>● Technical Control</td>
</tr>
<tr>
<td></td>
<td>● Control of both environment and society</td>
</tr>
<tr>
<td></td>
<td>● Technocratic environmentalism</td>
</tr>
<tr>
<td><strong>Hermeneutic Sciences</strong> (Individualistic, appreciative of society)</td>
<td>Human Interests Served</td>
</tr>
<tr>
<td></td>
<td>● Improving awareness</td>
</tr>
<tr>
<td></td>
<td>● Advancing understanding</td>
</tr>
<tr>
<td></td>
<td>● Ecocentric environmentalism is drawn on Hermeneutic Sciences</td>
</tr>
</tbody>
</table>
Table 8. Continued.

<table>
<thead>
<tr>
<th>Critical Sciences (Explanatory, developmental)</th>
<th>Human Interests Served</th>
<th>Related Ideologies</th>
<th>Environmental Education</th>
</tr>
</thead>
</table>
| * • Emancipation – freeing people from ideological constraints  
  • Exposure to how and why society operates  
  • Radical, ecocentric environmentalism is drawn on critical science  | * • Fundamentally radical  
  • Oppose the domination of empirical sciences (i.e. promote inequities)  
  • Fault the hermeneutic sciences (i.e. too ideological)  | * Aims to empower people to become agents of social change and sustainable development  
  • Democratic society  
  • Education for Sustainability |

(Huckle & Fien, 1993)

These varying philosophical approaches, when adopted, shaped the progressive shift in environmental education theory and pedagogy. EE has evolved exponentially, drifting, as indicated previously, like currents or waves happening over time and, in many cases, coexisting with each other (Table 9). Some (currents) ‘have a longer history than others, having been dominant during the first decades characterized by formal environmental education (the 1970s and 80s), while others correspond to more recent preoccupations. ‘These currents may therefore be approached from a diachronic perspective— each one emerging and developing within a particular historic and macro-cultural context’ (Sauvé & Berryman, 2005, p. 12).

Table 9. Fifteen currents in environmental education.

<table>
<thead>
<tr>
<th>Among those Currents with a Longer Tradition in Environmental Education</th>
<th>Among those Currents more Recently Emerged in Environmental Education</th>
</tr>
</thead>
</table>
| • Naturalist  
  • Conservationist/Resourcist  
  • Problem-Solving  
  • Systemic  
  • Scientific  
  • Humanist/Mesological  
  • Value-centered | • Holistic  
  • Bioregionalist  
  • Praxic  
  • Socially Critical  
  • Feminist  
  • Ethnographic  
  • Eco-Education  
  • Sustainable Development/Sustainability |

(Sauvé & Berryman, 2005)
The ‘currents coexist today influencing the organizations that facilitate education and their programs. The oldest currents are not outmoded; they are rooted in fundamental aspects of human-environment relationships; they have been further enriched over time’ (Sauvé & Berryman, 2005, p. 12). For further reference, Appendix two provides the characterisation of the fifteen currents in environmental education framing precisely their conceptions, aims, dominant approaches, and strategies.

These shifting currents of environmental education have been neatly condensed in this research and can be explained through three forms of environmental education (Table 10) that draw influence from the philosophical approaches identified previously (Huckle, 1993).

**Table 10. Three forms of environmental education**

<table>
<thead>
<tr>
<th>Form</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education for environmental management and control</strong></td>
<td>Predominantly serves the technical human interest, is based upon empirical-analytical science, and coheres most closely with the notion of education <em>about</em> the environment. Concerns developing awareness knowledge and understanding about human-environment interactions</td>
</tr>
<tr>
<td><strong>Education for environmental awareness and interpretation</strong></td>
<td>Predominantly serves the practical human interest, is based upon hermeneutic or interpretive science, and coheres most closely with the notion of education <em>through</em> the environment. Favours pupil-centred and activity-based learning</td>
</tr>
<tr>
<td><strong>Education for the environment</strong></td>
<td>Predominantly serves the critical human interest, is based upon critical science, and coheres most closely with the notion of education <em>for</em> the environment. Regards environmental improvement as an actual goal of education</td>
</tr>
</tbody>
</table>

(adapted from Fien, 1993b; Huckle, 1983; Tilbury, 1995)

The transition from education about- and education through, to education for is clearly articulated within these forms. Recognizing the evolving forms of environmental education is also a recognition that the pace in which the world generates environmental, political and economic problems was rapidly increasing. It appeared during this transition that relevant contemporary environmental education theory, policy and implementation
had been slowly shaping the discourse of EfSD (Curren, 2009). The World Conservation Strategy is identified as an early-adopter redirecting the goals of environmental education towards what it referred to as 'education for sustainable development' which required a re-conceptualisation of some aspects of environmental education, eliciting a greater prominence being attached to the root social, political, and economic causes of the environmental situation (Tilbury, 1995).

The distinction between EE and EfSD appears at first glance to be minor as educators involved in both would carry the vision of a more sustainable world as central to their practice (McKeown & Hopkins, 2005). However, what EfSD does that EE does not is draw from other associated disciplines including values education and environmental ethics to move beyond a focus on environmental concerns and values in isolation and to utilise an interdisciplinary approach encompassing human, social, and economic factors (McKeown & Hopkins, 2005; Smith et al., 2010). EfSD links the constructs of sustainable development and education. It forces us to recognise a link between seemingly opposite constructs. ‘Mankind likes to think in terms of extreme opposites. It is given to formulating its beliefs in terms of Either-Ors…’ (Dewey, 1986, p. 3). It is beneficial to associate sustainability and development as linked, not contrasting, concepts, thereby casting a net of commonality over the term (i.e. EfSD), clustering the properties necessary to understand them in unison, and to make sense of it holistically as opposed to being held in isolation of each associated concept (Jämsä, 2006). EfSD is ‘at least with respect to environmental concern, a nascent concept that has stimulated an important body of work and reflection on various topics such as economic development, agricultural production, social equity, and biodiversity’ (Shearman, 1990, p. 1). It is argued that the work of Thoreau, Leopold, and Carson have ‘clearly formulated many environmentalists’ intuitions that the destruction, overuse, or excessive appropriation of nature is morally wrong’ (Cafaro, 2001, p. 2). To then attempt to match objectively the concept of sustainability with that of development is both difficult to justify and, in many cases, counterintuitive and incongruent with dominant worldviews. Given that certain activities constitute a threat to human well-being through the destruction of environmental integrity, the question posed is can any construct associated with the term development serve as a basis for formulating appropriate environmental education and policy (Shearman, 1990). Conceptual foundations of EfSD (Table 11) attempt to address this debate identifying education and sustainable development as philosophical constructs.
grounded in metaphysics, epistemology, and axiology (Salite & Pipere, 2006). Comparing the foundations of sustainable development provided through a survey of doctoral students the following snapshot of the conceptual foundations emerge as follows:

Table 11. Conceptual foundations of EfSD

<table>
<thead>
<tr>
<th>Philosophical Aspect</th>
<th>Philosophy of Sustainable Development</th>
<th>Implementation in Education</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metaphysics</strong></td>
<td>Holistic experience of ecological and social world, looking for coherence, meaning, and integration.</td>
<td>Social/nature studies (subjects of mind/sprit). Integration link between theory-practice, formation of convictions, holism, biotism, spirituality. Revelation of the aim of SD.</td>
</tr>
<tr>
<td><strong>Epistemology</strong></td>
<td>Understanding of things, eternal choice between the opposite, tests to see what works, relative knowledge, and manifestation of a consciousness about the world in individual activities.</td>
<td>Research, projects, problem-solving methods. Interactive methods and discussions. Critical thinking. Simulations, creative works. Inner motivations to learn, analysis of cause/effect, understanding of diversity, balance, self-evaluation.</td>
</tr>
<tr>
<td><strong>Axiology</strong></td>
<td>Laws of nature, rational actions, eco-centric actions in coherence with the self, society, Universe. Empathy, tolerance, harmony</td>
<td>Making group and individual decisions in light of global consequences, personal responsibility. Optimism. Development of beauty participating in creative activities.</td>
</tr>
</tbody>
</table>

(Salite & Pipere, 2006)

The impact of worldviews (e.g. meaning making) and ethics (e.g. manifestation of consciousness), and the philosophical elements of environmental education (e.g. democracy – group decisions) are invariably interlinked with the conceptual foundations of EfSD identified above. The view of sustainability as a ‘developmental process’ in and of itself may lend further credibility to the view that sustainability and development are inextricably linked.

Many activists and environmental organizations were highly critical of the then current understanding of sustainability and the mainstream concepts presented by EfSD (Wade, 2008). As previously mentioned in the historical progression of EfS there existed a belief
that simply teaching people about the environment would result in changes to behaviour that were beneficial to the environment. Kollmus and Agyeman (2002) describe this as a ‘linear progression of environmental knowledge leading to environmental awareness and concern (environmental attitudes), which in turn was thought to lead to pro-environmental behaviour’ (Kollmus & Agyeman, 2002, p. 241). However, a growing body of research had already begun to assert that Kollmus and Agyeman’s observation of linearity was indeed not valid and that the crucial concepts assembled in a non-linear fashion (Fien, 1993b; Huckle, 1993; Sterling, 1992b; Tilbury, 1995). A fundamental theory in relation to education and sustainable development that was materializing was that sustainability, if it is going to happen, will be driven by an integrative learning process — it certainly won’t be about ‘rolling out’ a set of pre-determined behaviours (Vare & Scott, 2007).

Based upon these perspectives an enlightened understanding of education and sustainability has been realized that ‘seeks to appreciate the fundamental character of interactions between nature and society...addressing such issues as the behaviour of complex self-organising systems (e.g. networks) as well as the responses, some irreversible, of the nature-society system’ (Kates et al., 2000, p. 641). This field is characterized by the term EfS which focuses on interdisciplinary studies, processes and the achievement of dynamic learning qualities in students. It supports knowledge that is not passively appropriated but actively constructed through a developmental process. Furthermore, EfS relates knowledge to spheres of socially important action and requires the interrogation of assumptions and values that configure controversial issues. Finally, it seeks to encourage reflexive and responsible action grounded in environmental education, philosophical debates, and values-culture contexts (ENSI, 1999). As indicated previously, EfS has been selected as the term used in this research to connect the constructs of sustainability and education as result of its process orientation and interpretation of sustainability within a range of scales, both local, national and international (Wade, 2008). Other terms such as EfSD, sustainability education and learning have been, and will be, acknowledged in the discourse (Sterling & Thomas, 2006); however, EfS will be used interchangeably with these terms throughout the remainder of this research.

In conclusion, rather than searching for a definitive meaning for EfS, it is imperative to recognize the variety of definitions and to support and acknowledge the alternative
interpretations of the concept. It is evident when examining the theories and pedagogical frames (i.e. Sauve’s ‘Currents’) and historical events shaping sustainability (i.e. Elkington’s ‘Waves’) that the conceptualization of EfS will remain a non-linear and evolving concept. Regardless of the term used and its definition it may now be of more importance that effort is channelled into developing and delivering EfS processes and programs than becoming too hung up on the use of one term and the associated semantics (McKeown & Hopkins, 2003). Sustainability learning is one such ‘process’ borrowing conceptual understanding from the notion of social learning. It is understood that social learning occurs when a dominant institution is replaced by another referring to changes in societal practices and norms that are shared by a large number of stakeholders (Milbrath, 1989). The progression of EE to EfSD and to EfS, and the ongoing impact of evolving worldviews and ‘currents/waves’ throughout, can be seen as influential in this shift towards a focus upon learning processes. Indeed, the close of the UN-DESD has demonstrated that a richer understanding of processes of EfS and further exploration and implementation of learning are paramount (Buckler & Creech, 2014). Given the potential of sustainability learning processes to enable effective EfS, they are investigated further as this research transitions beyond offering merely a theoretical understanding of EfS towards examining the processes through which EfS is facilitated.

2.4 Sustainability Learning as a Facilitative Process

Sustainability is basically a process of learning, about developing knowledge, understanding and skills through learning to know, to do and to be (Combes, 2005). Whereas, the dominant conversation described at length in the previous section has been about how to characterize and describe the meanings of and connections between education and sustainability, the conversation has more recently expanded its focus to how sustainability itself can be characterized as a learning process embracing a wide range of learning experiences and programs (Combes, 2005; Tàbara & Pahl-Wostl, 2007; Wade, 2008). Adopting this perspective may be a useful means for cutting through the intellectual debate surrounding these concepts to approach them from the perspective of a process ‘characterized by an approach to guiding change’ as opposed to a fixed goal to be achieved through any specific intervention (e.g. technology, policy, action, etc.) (Mog, 2004, p. 2140). Relatively recently, learning was more closely aligned with an understanding of the concepts of sustainability systems and sustainable development
A reorientation of education to process, systems-driven provision of sustainability skills, values, knowledge and attitudes, coupled with a recognition of sustainability and sustainable development as a purpose for education, as opposed to an outcome, are helping to inform the global debate. These concepts are predicated on the pedagogical shift from education about, to education in, to education for sustainability discussed in the previous section (Hopkins, 2014; Taylor, 2014).

The structure of process-driven sustainability learning has its beginnings in social learning which infers learning processes amongst groups of people who seek to improve a common situation and take action collectively. Social learning theory approaches the explanation of human behaviour in terms of a continuous reciprocal interaction between cognitive, behavioural, and environmental determinants (Bandura, 1977). In the process of shared and cooperative learning, people develop the adaptive capacity to systemise, manage, and deliver change. The following general principles (Table 12) apply to this type of learning.

**Table 12.** Social learning principles

<table>
<thead>
<tr>
<th>Principle</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning by observing</strong></td>
<td>People can <em>learn by observing</em> the behaviours of others and the outcomes of those behaviours.</td>
</tr>
<tr>
<td><strong>Learning without change</strong></td>
<td>Learning can occur <em>without a change</em> in behaviour. In contrast, people can learn through <em>observation alone</em>, their learning may not necessarily be shown in their performance. Therefore, learning may or may not result in a behaviour change.</td>
</tr>
<tr>
<td><strong>Learning through cognition</strong></td>
<td>Cognition plays a <em>role</em> in learning. Awareness and expectations of future reinforcements or punishments can have a major effect on the behaviours that people exhibit.</td>
</tr>
<tr>
<td><strong>Learning as a bridge</strong></td>
<td>Social learning theory can be considered a bridge or a <em>transition</em> between behaviourist learning theories and cognitive learning theories.</td>
</tr>
</tbody>
</table>

In congruence with social learning in general it can be said that sustainability learning focuses on the process of generating and applying learning to a specific type of content. In particular, it relates to developing the capacity to manage options for the adaptation of
human societies to the limits and changing conditions that are imposed by their own social-ecological systems. The complexity of sustainability stresses we improve our understanding of ourselves, each other, the systems and science (Thomsen, 2008); and, entails becoming increasingly aware of the limits and of the unintended negative consequences of collective action upon systems and the capability to anticipate and managing those effects (Tàbara & Pahl-Wostl, 2007). Sustainability learning can be facilitated by social learning through social and ecological interaction (Thomsen, 2008). Learning is recognised as taking place throughout society-not simply in the formal institutions of schools, colleges and universities, but also in community groups, in the supermarket, at the home, in front of the television, at the workplace, etc. Informal learning in everyday life is perhaps a major key to unlocking the door to a more sustainable world (Blewitt, 2006).

Sustainability learning is facilitated through participant ownership and the groups’ capacity to engage in transformative change resulting in the achievement of sustainability outcomes. All aspects of the group and participants engaged are actively involved in learning and change for sustainability (ARIES, 2005). Decisions made that affect sustainable outcomes are often contingent on and require the engagement of knowledge across a number of disciplines (Funtowicz & Ravetz, 1993); and, challenges and problems aren’t bounded by specific expertise or disciplines (Miller, Wiek, Sarewitz, Robinson, Olsson, Kriebel, and Loorbach, 2013). Currently, shared decision-making and self-determination in learning have been put forward as essential to responsible citizenship. Shared decision-making implies that ‘interested parties not only intervene, but also become partly responsible for the outcomes’ (Bouwen & Taillieu, 2004, p. 2). This shared process considers that people learn from one another, including such concepts as observational learning, imitation, and modelling. Shared learning often results in what Bouwen and Tallieu (2004) refer to as communities of practice in which actors engage in joined activities, and by doing so form a common problem understanding and a common experience of some group identity.

However, as discussed previously, people construct their own worldviews and interpretations of sustainability. The existence of disparate worldviews make shared learning challenging without first developing common values and ethical frames. If the decision making process becomes increasingly difficult this often reflects a ‘values-actions’ gap where values do not align with behaviours or actions (Blake, 1999).
Addressing this gap there are two interrelated, complimentary approaches which consider sustainability learning as associated with values and behaviours (Vare & Scott, 2007, pp. 193-194).

1. Learning for sustainable development by promoting/facilitating changes in what we do and behaviours and ways of thinking; and,

2. Learning as sustainable development by building capacity to think critically about [and beyond] what experts say, and to test ideas through the exploration of the contradictions.

In addition, seven key factors that promote successful process-led approaches in a natural resource management context offer support to this values-behaviours approach to sustainability learning: i) a shared understanding and vision; ii) interaction among diverse groups; iii) appropriate and sustainable processes; iv) holistic problem-definition; v) promotion of responsibility, ownership and commitment; vi) a focus on people rather than institutions; and, vii) accessing support from a diversity of sources (Wondolleck & Yaffee, 2000). These seven factors demonstrate typical characteristics of an effective program of process oriented sustainability learning and will be shown in this research to be conducive to effective EfS facilitation. They were drawn upon throughout the research to contribute to identifying the dimensions by which EfS organizations and programs are delivered at scale. Indeed to adequately address the concerns regarding EfS as a process it may be appropriate to take a process-oriented approach to social change that addresses the structural challenges of learning itself (Mog, 2004).

### 2.5 International Not-for-Profit Organizations

To this point in the thesis, concepts of EfS and sustainability learning have been examined without extensive discussion of the organizations that are considered the ‘facilitators’ of EfS. For these concepts to be realized in theory and practice participants must be mobilized to enable them. Non-governmental Organizations (NGO) have been navigating the landscape of policy and practice through the facilitation of EfS for many years (Wade, 2008). Over the past several decades the rapidly marginalizing international borders characterized by the charge forward of globalization have resulted in an increase in the different types of organizations facilitating EfS. These include those in the private sector, such as NGO, Non-profit Organizations (NPO) and multi-disciplinary government agencies. Collectively, they involve hundreds of millions of dollars and the energies of
many dedicated individuals (Laurance et al., 2001). This increase is unlikely to subside as the GAP-ESD highlights strengthening multi-stakeholder, global, non-profit networks at the local and international level as a key action (UNESCO, 2014). The focus of this study was on NPOs mainly because the research will investigate these organizations working at international scale, and NPOs are internationally accepted, have formal structures, diverse social actors and their history in actively pursuing environmental, economic and social goals is well-documented (Wilson-Grau & Nunez, 2006).

An evolving term used in the literature to capture the many facets of the above-mentioned organizations is ‘transnational civil society’ (Helmut Anheier & Themudo, 2002; Davies, 2008). It is only relatively recently that this term and the bolder term ‘global civil society’ have entered into popular usage in academic literature regarding international organizations (Davies, 2008). They include not-for-profits (NFP) and NGO. For example, one of the key organizations belonging to a collective of transnational civil societies are International Non-profit Organizations (INPOs). Depending upon their geographical location they have also been referred to as International Non-Profit Association’s (INPA) and are essentially, not unlike all organizations bearing this designation, neither profit-making nor instruments of government (Davies, 2008). The aim of an INPO is to facilitate change across a variety of scales, without the encumbrance of profit making and distribution objectives. ‘They provide services as well as educate, advocate, and engage people in civic and social life’ (Powell & Steinberg, 2006, p. 3). Essentially, they are non-governmentally aligned and non-profit organizations with a mandate for un-coerced, collective action around shared interests, purposes and values (London School of Economics and Political Science, 2006).

Non-Profit organizations are by their nature diverse in market focus (e.g. climate change, education), offering (e.g. program delivery), composition (e.g. academic network), financial model (e.g. membership-based), and frequently governance (e.g. board or benefactor). Boris and Steuerle (1999; 2006) indicate that non-profits play a varying degree of roles in society including that of drivers of social, economic, and political change. More recently, these types of organizations have been referred to as ‘Communities of Practice’ (CoP), a broad descriptor characterizing participants coming together to engage with shared topics, issues and challenges (Cox, 2015; Wenger, McDermott & Snyder, 2002; Wenger, 1998). CoPs address the increasingly global nature of EfS facilitation linking people and organizations to local and global sustainability goals.
Regardless of name, INPOs experience significant variations in terms of mission, size, mode of operation and impact, particularly in a cross-national sense. They serve to link organizations, but in doing so they can also fuel stratification among levels and across societal sectors (Hayden, 2002). Some are closer to the model of a government agency; others may indeed resemble the business firm; and yet others may be little more than an informal or formal network (Anheier, Glasius, Kaldor, & Marlies, 2000). They operate across international borders and in a decentralised capacity having no fixed or easily defined geographical boundary (Roberts, Jones, & Fröhling, 2005). There is an emerging consensus among researchers that INPOs demonstrate the following characteristics (Table 13).

### Table 13. Characteristics of INPOs

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organizational</strong></td>
<td>They possess some institutional reality, which separates the organization from informal entities such as families, gatherings or movements;</td>
</tr>
<tr>
<td><strong>Privacy</strong></td>
<td>They are institutionally separate from government, which sets the entity apart from the public sector;</td>
</tr>
<tr>
<td><strong>Non-profit-distributing</strong></td>
<td>They do no return any profits generated to owners or equivalents, which distinguishes non-profits from businesses;</td>
</tr>
<tr>
<td><strong>Self-governing</strong></td>
<td>They are equipped to control their own activities which identifies those that are de jure units of other organizations; and</td>
</tr>
<tr>
<td><strong>Voluntary</strong></td>
<td>They are non-compulsory in nature and with some degree of voluntary input in either the agency’s activities or management.</td>
</tr>
</tbody>
</table>

(Anheier, Glasius, Kaldor, & Marlies, 2000)

Although it is not within the purview of this research to debate the scope, unit of analysis, or legality that comprises an INPO in its entirety it can be noted that the definition of an INPO is often regionally and/or internationally specific presenting a set of unique challenges. For example, an INPO may require ‘incorporation’ under the laws of a governing body. For example, the law in Belgium requires that the INPO be incorporated as an association (i.e. INPA) without lucrative purposes (i.e. Vereniging zonder winstoogmerk - IVZW) or Association sans but lucratif meaning ‘non-profit
organization’. This represents a formal designation under Belgian law, and organizations are formally entered in a register and allocated numeric identifiers.

Although not absolute in some measure there is agreement that INPOs can be defined as ‘those that are organized for public purposes, are self-governing, and do not distribute surplus revenues as profits’ (Powell & Steinberg, 2006; Salmon & Anheier, 1997). In reality, concurrent with this definition, there still remains a degree of vagueness surrounding this sector, and the recognition of tremendous variations in the kinds of institutions that are in existence on a global scale. For the purposes of this research the characteristics identified above are accepted as providing an appropriate framework for further investigation into the operation of international non-profits as facilitators of EfS. In addition, these organizations will be examined more specifically as CoPs; however, throughout the remainder of this research, (and for reasons elaborated on in further detail within Chapter 3 and 5) the term Decentralized Global Networks (DGNs) will be adopted to refer more broadly to all of the above mentioned organizational constructs.

### 2.6 Monitoring and evaluating EfS

Decentralized, global networks (DGNs) have grown in size, number and reach. Their interventions have been instrumental in shaping the resolution of many issues facing businesses and governments (Doh & Teegen, 2003). However, with this growth has come funding bodies (e.g. governments, private enterprise and individuals) increased scrutiny of DGNs program outcomes. The pressure of expanding numbers of those in competition for limited funding, escalating societal needs, rising cost of governmental programs, and demands for a better and more cost-effective delivery of goods and services are forcing not-for-profit organizations such as DGNs to make creative use of scarce financial resources (Chahine & Tannir, 2010; McKinney & Kahn, 2004). For example, over the past several decades DGNs have pioneered the initiative of providing finance to the poor to help alleviate their poverty and improve their socio-economic conditions. These needs are immense and the dependence of DGNs on donor financing hinders the sustainability and continuity of those activities (Chahine & Tannir, 2010). Organizational governance drivers such as accountability and reporting, concern with tax requirements and efficiency levels, now register as more vital as programs become increasingly difficult to maintain over the long term. One means of addressing these challenges is to ensure programs are
measurable and quantifiable and that program outcomes are addressed and communicated (Anheier et al., 2000).

More recently, practitioners and researchers alike are beginning to recognize that good program management goes well beyond implementation. In fact, effective management is integrally linked to well-designed monitoring and evaluation frameworks (Margoluis & Salafsky, 1998; Woodhill, 2000; Stem, Margoluis, Salafsky, & Brown, 2005). Over the past two decades the focus upon developing indicators to monitor and evaluate EfS has increased and been influenced by the present sustainability indicators, which tend to be an amalgam of economic, environmental and social gauges (Fricker, 1998). The UN identified monitoring and evaluation (M&E) as being one of the seven key strategies required for successfully advancing the objectives of the UN-DESD, with the UN International Implementation Scheme for the Decade calling for the development of relevant and suitable indicators at all levels (Tilbury, 2007). UNESCO not only recognized the importance of Monitoring and Evaluation Frameworks (MEF) and the development of indicators they also acknowledged themselves as playing a lead role in ‘fostering monitoring and evaluation’ and ensuring coordination during the UN-DESD (UNESCO, 2005b). Out of this period three notable developments are relevant here:

- The establishment of the UNESCO Monitoring and Evaluation Expert Group (MEEG) in 2007;
- The development of a Global Monitoring and Evaluation Framework (GMEF); and,
- The development of the UN-DESD National ESD Indicators Guideline in 2007.

A key accomplishment of the UN-DESD was the development of the Global Monitoring and Evaluation Framework (GMEF) which was designed to determine the baseline standing and continuous development of national and international facilitation of EfS. UNESCO affirmed that complementary research will help to: i) identify global issues; ii) capture innovative practice; iii) assess changes within and across the regions; iv) capture learning at global level; and, v) possibly, help stories and voices of ESD practitioners to be heard (UNESCO, 2007, p. 7).

In commencing the development of this GMEF the UN furthered its goals for a systemic approach to EfS. A key milestone of the GMEF was recognized as the need to develop indicators of progress and mechanisms for monitoring their achievement:
An initiative as long and complex as a Decade must benefit from adequate processes of monitoring and evaluation from the start. Without that, it will be impossible to know if the Decade is making a difference and what that difference is. An integral aspect of monitoring and evaluation will be the identification of suitable and relevant indicators at every level – local, national, regional and international - and for each initiative and programme (UNESCO, 2005b, p. 21).

Successfully, the GMEF has been engaged in tracking the progress of UN-DESD goals, and has provided a mechanism for EfS networks globally to plan and learn together. The GMEF was never intended to be a benchmark process, rather it was designed to collect significant amounts of relevant data (Tilbury, 2007). The GMEF’s reporting structure throughout the UN-DESD generated:

- In 2009, a report focusing on the contexts and structures of work on EfSD;
- In 2011, a report focusing on processes and learning initiatives related to EfSD; and
- In 2015, a report will focus on impacts and outcomes of the DESD.

Data collection and analysis provided opportunities for reflection on the different approaches to EfS across the globe as the UN-DESD was implemented (UNESCO, 2007).

The global monitoring and evaluation framework put into action by the GMEF on behalf of the UN-DESD, and as espoused by Fricker (1998), may provide measures that are potentially meaningful and actionable for an organization. However, at the organizational level it may be that these measures take the form of more granular performance indicators, which are measures that identify how well an organization or program is achieving its objectives. They can be used to define how performance is to be measured, along with, typically, a scale of measurement to allow for comparison and assessment. ‘Whereas a results statement identifies what we hope to accomplish, indicators tell us specifically what to measure to determine whether the objective has been achieved’ (USAID, 1996, p. 4). In developing and utilising indicators a systems approach should be applied which will assist in illustrating the dynamic state of social, economic and environmental quality (Henderson, 1994). In general, when selecting indicators EfS organizations can make use of the following eight criteria (USAID, 1996, p. 4).
i. Measurability;
ii. Inclusion of both qualitative and quantitative indicators;
iii. Relation to multi-demographics (e.g. ages, gender, socio-economic, cultures and abilities);
iv. Geographically specific;
v. Performance-based in the selection, planning, and operational phases;
vi. Related to accessibility making a link between supply demand and aspirations/ values;
vii. Related to something that can be responded to (where levers exist);
and,
viii. Short term, medium and long term.

The above-mentioned criteria identify the inherent multi-dimensionality, a focus on local needs, measures that are easy to understand, and reliable, accurate, and frequently reported data as significant components of MEF which potentially enhance global sustainability (Hart, 1995).

An EfS Key Performance Indicator (KPI), when systematically developed, should provide all participants with clear goals and objectives, coupled with an understanding of how they relate to the overall success of the organization. Published internally and frequently referred to they will also strengthen shared values and create common organizational goals. Indicator categories, as identified by Tilbury et al. (2007), assist participants to consider the various stages of EfS facilitation, for example, the program starting point, the achievements made and the communication of these achievements.

Three categories of these indicators are identified (Tilbury, 2007):

1. Status Indicators: assess variables that determine the position or standing of ESD in a country. Baseline indicator types belong to this category;
2. Facilitative Indicators: assess variables that assist, support or encourage engagement with ESD. Context, process, and learning indicator types belong to this category; and
3. Effect Indicators: assess variables relating to initial, medium and long-term achievements during the DESD. Output, outcome, impact and performance indicators belong to this category.

These three categories are further segmented into eight indicator types corresponding to and mapped against an identified function (Table 14).
Table 14. Indicator Types

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator Type</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Baseline</td>
<td>To identify the status of the overall EfSD picture.</td>
</tr>
<tr>
<td></td>
<td>Context</td>
<td>To identify the existence of EfSD support systems.</td>
</tr>
<tr>
<td></td>
<td>Process</td>
<td>To identify the existence of EfSD processes and activities.</td>
</tr>
<tr>
<td></td>
<td>Learning</td>
<td>To promote learning and reflection on EfSD.</td>
</tr>
<tr>
<td></td>
<td>Output</td>
<td>To assess outputs such as tools and learning resources.</td>
</tr>
<tr>
<td></td>
<td>Outcome</td>
<td>To assess outcomes related to changes or improvements that result from EfSD efforts.</td>
</tr>
<tr>
<td></td>
<td>Impact</td>
<td>To assess impacts that result from EfSD efforts.</td>
</tr>
<tr>
<td></td>
<td>Performance</td>
<td>To assess the change in the status of the overall EfSD picture in a region or country.</td>
</tr>
</tbody>
</table>

(adapted from Tilbury & Janousek, 2006)

These criteria are for guidance only as MEF and indicators, although interpreted as the fundamentals of the system, may vary or change over time (Tilbury, 2007).

Further research, experiences and dialogue will be required to improve the modelling and validity of indicators and to ensure a framework in which to structure monitoring and evaluation initiatives is more widely applied (Tilbury & Janousek, 2006). During the UN-DESD, for example, research identified some limitations of monitoring and evaluation focusing on the model presented by the GMEF. These observations will assist in the development of MEF more broadly and include:

- The GMEF has been developed to assess implementation of the UN-DESD. In reality, it is more likely to capture the changes occurring during the ten year period marked by the UN-DESD and not just initiatives developed under the label of the UN-DESD.

- Resource and time constraints will mean that it will be difficult to reach everyone involved in UN-DESD or EfS activities.
• Although a baseline assessment of progress will be sought in the first cycle of data collecting and reporting, it is likely that the relevant data is not readily available. The lack of resources means that only information that is available can be compiled. This limits the depth and reach of the global monitoring process.

• Prior academic or practical knowledge of EfS indicators is limited. The GMEF is built upon the experience of the UNECE and Asia-Pacific regions in this area. However, these experiences are recent and in their early stages of implementation. More research, experiences and dialogue are needed (UNESCO, 2007).

In addition, a pre-UN-DESD study identified data regarding monitoring and evaluation by DGNs which includes:

• More than half (56%) of the recently completed evaluations (N =140) were designed primarily to measure outcomes or impact.

• However, of the recently completed evaluations, 9% assessed program implementation, 9% informed strategic planning, 7% assessed the quality of operations, and 4% measured client satisfaction.

• 46% of the Interviewees measuring outcomes reported doing so because it is a funding requirement (Fine, Thayer, & Coghlan, 2003).

The UN-DESD (i.e. macro) and more specific network (i.e. micro) findings are significant for DGNs as they face Government policies of deregulation, decentralization and increasingly market-driven approaches to funding bringing to the fore mechanisms in which effective EfS are monitored and evaluated (Hill, 2005). The introduction of MEF allows decision makers to assess whether and how goals are being achieved over time (Kusek & Rist, 2004). A strategic approach would be that the organizations themselves take the lead in determining the MEF strategy and the indicators as it is important to involve key participants in their development from the outset (Henderson, 1994; Boswell, 1995). However, as will be illustrated in the results chapter, and through discussions with key informants, there remains limited understanding of effective facilitation of EfS programs and of a theoretical framework upon which scalability, facilitation and monitoring efforts are based. There are also few specific MEF and globally recognised accountability systems designed to assess a DGNs operating as a facilitator of EfS. An
integral and novel aspect of this research is the examination of increasingly influential structural changes occurring in the development and implementation of EfS programs at a transnational level. This relates to the role that an internationally dispersed organization plays in creating a ‘power centre’ beyond which any centralised organization could successfully operate and points to the requirement for M&E Frameworks to be able to examine the facilitation of EfS at multiple scales.

2.7 Chapter Two Conclusion

Chapter two has presented the key conceptual and contextual aspects, which shape this study. The broader context of the research indicates that the facilitation of EfS by DGNs is process driven and contingent upon the development of networks that account for scale and evaluation as key factors. One of the less discussed features of characterizing sustainability discourses is the recognition that it is a multiscalar challenge (Perey, 2014). Organizing approaches to sustainability challenges requires researchers and practitioners alike to work across more than one level. The chapter places focus on the gap in the literature regarding how DGNs scale up, out and in within their organizations and programs in the pursuit of facilitating EfS.

In addition, the Chapter highlights that an important aspect of this study is the inclusion of the values-cultural debates implicit within differing worldviews and the impact of globalization upon the facilitation of EfS. Importantly, Table 15 revisits the Chapter structure and makes explicit the links to the key research questions and to the gaps identified. It also points to Chapter 3, which will examine scalability the theoretical framework through which the study will be conducted.

Table 15. Literature review links to the research questions and research gaps

<table>
<thead>
<tr>
<th>Section</th>
<th>Section Purpose</th>
<th>Addressing Research Questions and/or Research Gaps Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section 2.1 - Introduction</strong></td>
<td>To introduce the key literature and drivers to be covered within the literature review providing a structured overview.</td>
<td>Introducing the structure of the literature review and key sections.</td>
</tr>
<tr>
<td>Section</td>
<td>Section Purpose</td>
<td>Addressing Research Questions and/or Research Gaps Identified</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Section 2.2 – Environmental Ethics</strong></td>
<td>To identify environmental worldviews, ethics and the dominant discourses framing the debate around the term EfS.</td>
<td>The development of an environmental and sustainability ethic provides a lens through which to view the progressive development of EE to EfS. The discourses indicate the inherent complexity and contextuality of EfS.</td>
</tr>
<tr>
<td><strong>Section 2.3 – Education for Sustainability</strong></td>
<td>To examine the development and progression of the terms sustainability and EfS providing justification for their use in the research.</td>
<td>Investigation of the key literature contributing to the use of EfS as opposed to other terminology. Literature demonstrates that EfS is multi-dimensional and process oriented which assists in building the theoretical basis upon which the research framework is developed.</td>
</tr>
<tr>
<td><strong>Section 2.4 – Sustainability Learning</strong></td>
<td>To articulate the progression of EfS from concept to process.</td>
<td>Identifies EfS as process-driven and sustainability learning as cooperative and socially constructed. Conceptually important to the identification of networks as facilitators of EfS.</td>
</tr>
<tr>
<td><strong>Section 2.5 – International Non-profit Organizations</strong></td>
<td>To provide a overview of the drivers and structure of not-for-profit organizations and to identify DGNs as a variant of these well-established networks.</td>
<td>Identifies that EfS requires an organization to facilitate it and that DGNs are well placed to perform this task due to their organizational structure and the programs they deliver.</td>
</tr>
<tr>
<td><strong>Section 2.6 – Monitoring and Evaluation</strong></td>
<td>To identify the developing research and theory regarding the delivery of EfS MEF</td>
<td>MEF assist in the facilitation of EfS through their evaluation of context, process and outcomes. Monitoring and evaluating program delivery is a critical aspect of facilitating effective EfS and conceptualizing the impact of scale.</td>
</tr>
</tbody>
</table>
Table 15. Continued.

<table>
<thead>
<tr>
<th>Section</th>
<th>Section Purpose</th>
<th>Addressing Research Questions and/or Research Gaps Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 2.7 – Chapter Conclusion</td>
<td>To make explicit the links between the literature reviewed and the research questions; and, to provide an overview of the literature review linking each section to the research gaps identified.</td>
<td>Reiterating the focus of the research and its connection to the literature by illustrating the progression from the literature review to the development of the theoretical framework.</td>
</tr>
<tr>
<td>Chapter 3 – Scalability</td>
<td>To identify the formation of decentralised global networks as organizations that facilitate EfS; and, to introduce the theoretical framework (scalability).</td>
<td>A multi-scale nested approach is presented and it is argued that this approach is conducive to facilitating EfS. Scalability (i.e. scaling up, out and in) is introduced as the theoretical lens through which the research is undertaken.</td>
</tr>
</tbody>
</table>

The progressive conceptual understandings of EfS were significantly evident in both the wide-ranging interpretations of the term and the different approaches to EfS adopted by nations and the authorities within those nations throughout the UN-DESD (McKeown & Nolet, 2012). However, encouraging progress lies in the understanding that despite early concerns about attempting to define sustainability and its connection to education the more recent debates indicate that it is now understood as a learning process rather than a goal or endpoint (Tàbara & Pahl-Wostl, 2007). EfS is now viewed as developmental, a work in progress, which influences perceptions of and approaches to sustainability. Focusing on the process encourages researchers, practitioners and educators to apply a range of tools to approach EfS as opposed to debating its meaning. These tools include networks, scale and effective MEF which are designed with the purpose of assisting in responsible decision making according to the ideal of sustainable development (Klauer, Drechsler, & Messner, 2006).

In conclusion, the thesis thus far has: i) identified the impact of worldviews and ethics upon EfS; ii) drawn together the existing knowledge of EfS and process-oriented sustainability learning; iii) examined the global organizations that facilitate EfS; and, (iv) presented the monitoring and evaluation frameworks being developed to examine EfS.
Chapter 3 examines the conceptual approach of scalability which will be further unpacked as the theoretical framework of the thesis. Chapter 4 identifies the research design including the researcher’s philosophical position and the framework in which the research is grounded. The chapter also examines the methods applied, the process of analysis and the ethical considerations and rigor built into this research.
Chapter 3: Scalability
Chapter 3. Scalability

The concepts which form the basis for Environmental Education (EE), sustainability learning and/or EfS have been thoroughly examined over the last 40 or more years of theorizing and implementation. Understanding these continuously evolving concepts has led to a significant body of research. As contemporary environmental and sustainability educators perhaps know less about the application of these concepts, there is an opportunity to investigate the dissemination and application of sustainability knowledge and learning across a large number of schools, organizations and regions (OECD, 1999). Wide-scale ‘dissemination’ of EfS has been elusive and requires a systemic, integrated approach to the multi-faceted nature of sustainability (Hochachka, 2007). The introduction of, for example, Information Communication Technology (ICT) for advancing and leveraging communication between geographically dispersed organizations has assisted the seemingly endless supply of knowledge flow and transfer between organizations and across borders. ICT has led a shift towards globally connected organizations developing scaled up projects though decentralization, broadening the impacts of the organization (Bouwen & Taillieu, 2004; Uvin, Jain, & Brown, 2000). This ‘scale up’ was likely influenced by the increasing accessibility to these technologies as the ICT industry expanded in the early 2000s. In addition, the UN-DESD emphasized as one of its seven implementation strategies within the International Implementation Scheme that stakeholders are encouraged to utilise ICTs to engage with their own organizations, their networks and alliances (UNESCO, 2005b).

The application of scale to the dissemination of information has been referred to as ‘networkization’ - the transfer of an increasing stream of technology, finance, trade, knowledge, people, values, and ideas across borders (Knight & de Wit, 1997). This approach addresses how best to involve dispersed and disparate groups in a more active and participatory role in sustainability planning, policy analysis and decision making (Van Peborgh, 2008). For example, there is often a gap between the program stakeholders and the information that they require. ICT, as a learning, medium plays an important role in bridging this information gap (Mehta & Kalra, 2006). Notwithstanding, the advantages of technology are not so much in creating new communities, but in strengthening already existing networks (Mehta & Kalra, 2006), and in developing networked groups as an integral component of a much broader civic movement. Nesting networks within other networks or wider communities to ‘bridge the information gap’ provides a plausible
model for scaling EfS (Capra, 2007). Figure 1 illustrates the concepts in the seminal work by Baran introducing ‘networkization’ by identifying three common network types (Baran, 1963). It is from these network types that the research draws comparison and introduces the concept of multi-dimensional networks and scalability.

Figure 1. Types of networks

Decentralized networks, particularly, are grounded in principles of cooperation amongst groups and the building of connections. They are mobile, integrated, oriented towards learning and quality-focused (Hoube, 1998). Networks assist in the creation and use of knowledge at scale (Lupele, 2007) and are structured around five dimensions: i) protocols; ii) activities; iii) nodes; iv) transparency; and, v) administration (Werbach, 2011). Contrary to the belief of networks as self-organizing, orderly hierarchical structures they more often represent collective practice and are characterized by common intention, social-orientation, voluntary participation and exchange principles (Schrittesser & Rauch, 2003). Of these three network models the decentralized model is examined in this research developing as a key component of the research framework and is, therefore, expanded upon further in this research.

The brief introduction above to networks and decentralization has established the basis in which to introduce the first of four journal articles, which intentionally form a significant part of this thesis. The first article ‘Scaling Sustainability Learning: Size and Scope Matter’ introduces the concept of scalability. It notes the impact of DGNs and networks upon programs delivered at scale and the scarcity of documented evidence regarding the current approaches by DGNs. In addition, the article develops a theoretical framework for the evaluation of EfS programmes delivered through decentralized global networks.
Author Contributions

Michael S. Duggan was the lead author to the publication titled *Scaling Sustainability Learning: Size and Scope Matter* providing 90% of the content of this publication. Timothy F. Smith and Dana C. Thomsen provided 5% of the content each assisting in conceiving/designing the methods and contributing materials/tools to the process of analysis. Michael S. Duggan collected all of the data and conducted all of the analysis.

Version 2 of this article has been included in this thesis publication as per Copyright requirements stipulated by the Journal publishers.

Michael Stewart Duggan Timothy F. Smith Dana C. Thomsen


**Scaling Sustainability Learning: Size and Scope Matter**

MICHAEL S. DUGGAN, TIMOTHY F. SMITH and DANA C. THOMSEN

**ABSTRACT**

Working across scales presents barriers and opportunities to Education for Sustainability (EfS) programmes. It changes the way these programmes are implemented and can provide the tools for addressing systemic problems that have so far eluded localized approaches to sustainability learning. In particular, issues of scale affect the implementation of contemporary EfS through: i) greater use of communication technologies that can support information exchange and educational programmes across ever-increasing distances; ii) the development of a broader scope for educational investment from outcomes based around individuals to opportunities for societies and even globally; and iii) increased emphasis on the intractable nature of complex sustainability issues towards a focus on approaches that can effectively link local and global scales. Decentralized, global networks have emerged in the development, operation and implementation of EfS programmes to capitalize on these advantages and
address issues associated with scale. However, there is little documented evidence of the success of decentralized global network approaches or of the inherent barriers and opportunities in scaling up EfS programmes from the local to the global scale. This paper examines the concept of ‘scalability’ to develop a theoretical framework for the evaluation of EfS programmes delivered through decentralized global networks.

**Keywords:** decentralized networks, education for sustainability, globalization, monitoring and evaluation, scalability, sustainability learning.

### 3.1 Introduction

Increasing recognition of environmental, economic and social issues on a global scale facilitated by advances in information and communication technologies are significant features of what has been termed globalization (United Nations, 2003). These trends have also changed the educational demands of individuals, organizations and nations, whereby education is increasingly considered an investment in the collective future of societies and nations, rather than simply the future success of individuals (UNESCO, 2002). This has implications for the way educational programmes are conducted — particularly those of international significance and that require an effective combination of local and global perspectives such as those characterized by Education for Sustainability (EfS). The literature of globalization has increasingly focused on the formation of new centres of power (other than centralized governments) and these centres are increasingly affecting the direction and pace of change in the world, partly caused by the integration of broad processes of systemic thinking (Suter, 2003; Weyler, 2004). AtKisson (1999) asserts that a system is simply a collection of separate elements that are connected together to form a coherent whole. For example, Greenpeace International is a systemized global organization, which represents an idea, as opposed to a centralized group of people as in the case of the nation-state. Essential to Greenpeace as an internationally dispersed organization is the very idea that they play an integral role in the interface between nature and society, thereby, creating a centre of power beyond that which any centralized government could operate (Weyler, 2004). The development of global networks results from applying the principles of systems to the expansion of a powerbase.

The implementation of the United Nations Decade of Education for Sustainable Development (UN-DESD) provides a timely example of one of the most extensive EfS
initiatives to date relying significantly upon a global and decentralized base of power to deliver upon its objectives. The principal objectives of the UN-DESD are the development of robust mechanisms for assessing: i) global progress in its implementation; and, ii) UNESCO’s own contribution to the implementation of the UN-DESD (UNESCO, 2007). Supporting sustainability through education, the UN-DESD seeks to assist the scale at which EfS programmes can be delivered. Specifically, this initiative aims to ‘…engage new and current stakeholders in all the different levels and contexts to create awareness and participation in environmentally sustainable development’ (Mula & D. Tilbury, 2009). As Mula and Tilbury (2009) note, many stakeholders will already be active contributors to the UN-DESD goals—the challenge will be to involve those with significant influence that are less aware of such issues. The development and facilitation of EfS programmes before and during the UN-DESD have been wide-ranging geographically and differing in scale. An emerging trend has been the application of decentralized global networks to develop and operate EfS programmes. This tendency is likely to proliferate as communication technologies continue to improve and the benefits of diverse and global perspectives are realized.

Essentially, decentralized networks are an engineered product of globalization, which results from a reduction or removal of barriers between national borders, organizations, and people. Systemic engineering of networks may result in the flow of information between borders, resulting in stocks of information generated within the network, and resulting in feedback loops of information and knowledge between networks. However, globalization and some decentralized global networks may conversely act to restrict the flow of information (e.g. creating monopolies on particular production chains, etc.). These varying and resultant systemic trends of information feedback loops manifest themselves as drivers and barriers of projects and influence the outcomes integral to the rapid expansion of global networks. Nevertheless, this is a recent approach and there is little documented evidence of the success of such approaches or the barriers and opportunities for EfS. This paper explores approaches that enable information exchange and programmes that aid the development of a broader scope for educational investment. The paper covers four core areas: i) the effect of globalization on enabling information exchange and educational programmes; ii) the rationale for a broader scope for educational investment; iii) approaches that effectively link local and global scales; and iv) characteristics of decentralized global organizations that enable this link.
3.2 Enabling information exchange and educational programmes

Globalization is one such concept that enables the development of learning mediums that drive decentralized initiatives and agendas across scales. This connectivity model, enhanced by increasingly accessible technologies, provides opportunities for global networks to connect with the systems and processes required to enable EfS to be effectively facilitated at local, regional, national and international scales. Gibson (2006:19) considers that technology will drive the development of an increasingly systemic public commons.

Technology is seen by many as one of the most promising venues for encouraging, facilitating, and increasing citizen-centered dialogue, deliberation, organising, and action around a wide variety of issues, but it has been relegated to the side-lines in many of the public discussions about service and civic engagement (Gibson, 2006).

There is a growing appreciation that it is not human technology so much as patterns of human activity that is challenging the sustainability of human development (Parrish, 2007). Demonstrating the contradictory nature of globalization, the sustainability movement itself has grown into a key instrument within the globalization process, with activists using global networks, such as internet-based social media, to organize international demonstrations against global processes that include, for example, the practices of transnational corporations and international free trade regulations (Sachs, 2000; McGrew, 2007; Meyer, 2007; Krishna, 2008). The emerging Global Information Society and information economy, and the resultant development of novel patterns of human activity evolving from these developments, hold implications for EfS throughout the sustainability learning process providing justification for further research into the impact that globalization and decentralized networks have upon the scalability of organizations and projects. The Internet is a significant enabler of scale and may actually be the most powerful tool to hit humanity since the advent of agricultural communities. The explosive growth of global virtual communities of people united across borders, race, sex, religion, etc. by interests and beliefs, and the nearly instantaneous ability to share ideas — both revolutionarily wonderful and awkwardly unremarkable is clearly the kind of transformative tool that would legitimately be considered a leverage point (Van Peborgh, 2008). As indicated by Cogburn (1998:1):
At a more conjunctural and secondary level, globalization is affecting all of the social, political and economic structures and processes that emerge from this global restructuring. One critical issue that emerges from all of these restructuring processes is the central role of knowledge, education and learning for the success of the Global Information Society (GIS) and global information economy. Knowledge is becoming an increasingly important factor of production. More important, some analysts would argue, than land, labour and capital.

In the context of sustainability learning this restructuring of processes is closely aligned to what Tabara and Pahl-Wostl (2007) identified as the requirements for the effective flow of information and knowledge. It is also aligned to what Bouwen and Taillieu (2004) identified as a condition for the development of communities of practice. Both concepts remain integral to the systemic and scalable development of global networks as they provide a framework for communication and connection identified by the authors as integral to sustainability learning.

A whole-minded aptitude is fundamental to the practice of developing communities of practice that integrate design, development and facilitation of ideas and knowledge. Pink (2006), building on Heskett’s (2002) terms, identified the requirement for utility and significance in the general design of systems. A focus upon these two integral elements of design can simplify an otherwise intricate system which may otherwise be fraught with complexity. Utility satisfies a systems requirement for a product or service to perform the specific function for which it is intended. Whilst, significance requires the product of the system to provide an aesthetic appeal that transcends its functionality (Pink, 2006)]. For example, a ship builder must construct a boat that will float and remain watertight (utility). However, the boat is a symbol of freedom and enjoyment for the owner and conveys this emotion to its passengers (significance). Establishing a link between utility and significance provides a strong platform from which to design, develop and facilitate global, decentralized networks. As a result of the aforementioned rise in communications technology and global network development, design of cross-border projects has become an increasingly collaborative process requiring an emotional connection to be fostered and up-scaled through the implementation of structured programmes. Consequently, the use of technology in, for example, multi-disciplinary network development, is a human-created means of ordering physical elements to perform a specified function (Parrish,
2007) using technology as a tool to enhance the performance of said function. It is argued that globalization and the delivery of EfS at various scales afford the opportunity to augment the link between utility and significance in network development through a heightened awareness of the requirement for systems thinking as an integral part of the development of global networks and delivery of EfS.

3.3 A broader scope for educational investment

Research into scale has been tenuous as a result of scaling up efforts, in the first place, generally initiated with development goals, rather than with research goals. Indeed, Catacutan (2005) asserts that the knowledge base generated from research into scale and its impact upon organizations and the programmes they deliver could actually make a significant contribution to the further scaling up of appropriate technologies, programmes or strategies. However, there remains a limited amount of literature investigating the scalability of EfS programmes and the organizations that deliver them demonstrating the often detached worlds of research and development.

The concept of scale, as it relates to EfS, is grounded in current and emerging national and international sustainability drivers. From an international perspective, the Millennium Development Goals (MDG) identified promoting education and environmental sustainability as integral to achieving the MDG plan and realizing the quantitative targets set for the year 2015 (Sachs & McArthur, 2005). As indicated previously, providing effective EfS was endorsed as an imperative in Australia (DEH, 2005; DEWHA, 2009). However, as Sachs and McArthur (2005:350) note, ‘scale-up of interventions and policies required to meet the MDGs will demand long-term investments in management systems, training and retention of human resources, and infrastructure’. This is a result of the increasing pressures to account for resources and to demonstrate that they are important investments of public assets. A combination of economic and developmental motives makes a good justification for scaling projects.

In order to understand the impact of scale upon educational delivery, there is a requirement to monitor its application. Monitoring and evaluation systems are one such means for identifying the scalability of projects. There is a growing body of literature (e.g. Margoluis and Salafsky, 1998; Tilbury, 2005, 2007, and 2009; Bellamy, et al., 2005; Stem et al., 2005; Klauer, Drechsler, and Messner, 2006;) investigating EfS indicators, monitoring, and evaluation. Embedded in the global context is the requirement for
congruence between organizational objectives, strategic objectives, and programme outputs of which monitoring and evaluation programmes provide structure. The Global Monitoring and Evaluation Framework (GMEF) have been developed as a rigorous framework to achieve congruence (Tilbury, 2009). However, although the Monitoring and Evaluation Frameworks (MEF) potential for programme congruence and systems evaluation is identified as far reaching (Tilbury, 2010) and a core purpose identified for the UN-DESD (UNESCO, 2007), in reality, financial backing for the UN-DESD GMEF was ‘limited’ (Tilbury, 2009:192) and, therefore, the operationalization of the GMEF was stalled. Drawing on the UN-DESD experience, Tilbury (2009, 2010) and Mula and Tilbury (2009) have highlighted several potential barriers to the effective monitoring and evaluation of a global-scale programme including: lack of explicit intentions and goals; limited funding allocated to monitoring and evaluation; and, lack of formal data collection systems. Lessons from the related Natural Resource Management (NRM) context indicate the utility of a systems approach for developing a monitoring and evaluation framework. In particular, Bellamy et al. (2005:27) identify a systems approach to unlock the potential of evaluation to ‘identify a wider variety of outcomes (e.g. social, political, economic, environmental, and institutional)’. The systems approach to the UN-DESD appears to be established under the guise of the GMEF; however, is currently lacking at a global, and in many cases regional and local, level the impetus to ensure that the GMEF is funded, delivered, and adequately monitored and evaluated. As noted by Mula and Tilbury (2009) ‘despite these challenges, the DESD has raised expectations amongst EfS stakeholders, who see this platform as a good opportunity not only to embed EfS at all education levels but also to influence government decisions and to move towards social and economic systemic change’(p. 88).

Barriers to monitoring and evaluation must be addressed prior to the commissioning of EfS projects if scale is to be engineered into organizational development and programme delivery. Well-designed approaches to scaling EfS could have wide ranging impacts upon the implementation of monitoring and evaluation frameworks. Scale involves adapting an innovation successful in some local setting to effective usage in a wide range of contexts. In contrast to experiences in other sectors of society, scaling up successful programmes has proved very difficult in education (Dede, Honan, and Peters, 2005). Scalability in the context of EfS is the property of reducing or increasing the scope of education and learning methods, processes, and management according to the project
size and reach. One way of assessing scalability is with the notion of scalable adequacy — the effectiveness of an EfS framework or process when used on differently sized problems. Certainly, each setting contains roadmaps of how innovations have successfully scaled up, or failed to do so. The quality of implementation needs to be monitored and described, including the planned and actual intervention, and the planned and actual implementation support systems (Greenberg et al., 2002). Inherent in this idea is the capability to scale the process to particular project needs, contractual requirements, or even to budgetary and organizational goals and objectives.

3.4 Approaches that effectively link local and global scales

Scalability, as an organizational concept, realizes an enhanced impact if it can serve as an example for other projects, organizations, and communities across the globe to emulate. Scalability in and of itself can be evidence that an idea is sustainable, at least in the more traditional sense of the word (Catacutan, 2005) as a sustainable idea should be able to be replicated and repeated with continuing success and in perpetuity. In business, the most promising commercial endeavours are the ones that exist independently of any single person's unique expertise. If a company has to rely on the creativity or management expertise of a single person, the continuation of that company's operations is at great risk. Perhaps, more importantly, the growth and profitability of a business may be stifled by the inability of its model to scale to other regions when it is managed by different people in different cultural contexts. EfS projects are not dissimilar to those found in other businesses. EfS projects that involve local people with unique talents may be quite advantageous in the short term; however, when the leaders move away, move on to something different, or retire altogether, the project is put at risk of declining continuity and stagnation. One way to assess these risks is to hypothesize if a project could be scaled up to include the neighbouring community, the rest of the country, or the rest of the world. If this is the case, then the project probably has good prospects for operational sustainability. However, if the project doesn't pass this test, it probably will not be sustainable in the long-term or even in the short-term in a disparate group of places. It would be quite wasteful for organizations to ignore the impact created by scalable ideas and models that can be adapted to a greater number of communities.

The lack of research into scalability, as previously indicated by Catacutan (2005), is considered problematic and is primarily due to the traditional view that:
(i) dissemination and scaling up is devoid of research; and

(ii) it is free from the responsibility of pure development and extension agencies.

This reflected the long-held gap between research and development into scalability. However, if research and development institutions are to close this gap, scalability research should be high on their agenda (Catacutan, 2005). The concept of scalability could be validated and benefit from an evaluation of programme effectiveness. Catacutan’s (2005) early research in characteristics and conditions lends to scalability research by looking at the advances made towards meeting a programme’s objectives, as well as an analysis of conditions predisposed to successful implementation. An adaptation of the Programs Context and Pre-conditions Matrix (refer Table 16) may well assist the early identification of a project’s predisposition to scale, making it easier to identify and select programmes that can be effectively delivered at scale.

**Table 16. Program Context and Pre-Conditions Matrix**

<table>
<thead>
<tr>
<th>Key Characteristics of the Programme (Programme Context)</th>
<th>Fundamental Conditions</th>
<th>Necessary Conditions</th>
<th>Negotiable Conditions</th>
<th>Non-negotiable Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participatory</strong></td>
<td>High relevance to potential users</td>
<td>Sense of volunteerism and participation values</td>
<td>Participatory approaches, pre-existing human or social capital</td>
<td>Facilitation skills, capability building activities</td>
</tr>
<tr>
<td><strong>Information oriented</strong></td>
<td>Availability of Information-equipped institutions</td>
<td>Participatory generation of appropriate technologies</td>
<td>Dissemination approaches (e.g., stakeholder-to-stakeholder, etc.)</td>
<td>Continuous flow and sharing of information</td>
</tr>
<tr>
<td><strong>Key Stakeholder-focused</strong></td>
<td>High program relevance to key stakeholders</td>
<td>Participation, unity and cooperation, sense of solidarity</td>
<td>Pre-existing human and social capital</td>
<td>Training, capability building and facilitation</td>
</tr>
</tbody>
</table>
Based on partnerships

<table>
<thead>
<tr>
<th></th>
<th>Government support</th>
<th>Other institutional support</th>
<th>Pre-existing partnership schemes</th>
<th>Convergence of common interests and goals</th>
</tr>
</thead>
</table>

(Adapted from Catacutan, 2005)

The authors argue that all programme characteristics and corresponding conditions indicated above are required for EfS programmes to be successfully scaled up, out and in. The key research objective is to recognize how the identification of these characteristics and conditions lend themselves to successfully developing projects with in-built capacity for scale.

Scaling projects and the organizations that deliver them is a multi-tiered process and requires congruence between programme characteristics and a commitment to a participatory approach. Uvin (1995) suggested that scaling up is about expanding impact and not just becoming larger. Uvin (1995) identified four types of scaling up (refer to Table 17).

**Table 17. Four Types of Scaling Up**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative</td>
<td>A programme or an organization expands its size by increasing its projects or constituency through an increase in geographic area or budgets.</td>
</tr>
<tr>
<td>Functional</td>
<td>An organization expands the number and the type of its projects e.g. from EfS to sustainable development consulting, etc.</td>
</tr>
<tr>
<td>Political</td>
<td>The organization moves beyond service delivery towards empowerment and change in structural causes of underdevelopment. This usually involves active political involvement and the development of relations with the state.</td>
</tr>
<tr>
<td>Organizational</td>
<td>Organizations increase their organizational strength to improve the effectiveness, efficiency and sustainability of their activeness. This is through diversifying fund sources, increasing level of self-financing/income generation, assuring the enactment of public legislation earmarking entitlements within the annual budgets for the programme, creating external links with other organizations, or improving internal management capacity of staff.</td>
</tr>
</tbody>
</table>

(Uvin, 1995)
A combination of the above four types of scaling up is often required to provide an overall net gain in scalability and programme development, meet project characteristics and conditions, and increase the impact of the organization and its projects. These net gains can be accomplished through: expanding the coverage and size of the organization; increasing activities and projects; broadening indirect (i.e. other stakeholders) impacts; and, enhancing and ensuring organizational sustainability (Uvin et al., 2000).

There is a requirement for scalability to be implemented via a multi-dimensional approach inclusive of vertical and horizontal scales. Methods for scaling EfS ought to be thought of as non-linear. For example, as an organization advances higher up the institutional levels (vertical scaling up), the greater the chances for horizontal spread; likewise, as one spreads farther geographically (horizontal scaling up), the greater the chances of influencing those at the higher levels. Two significant dimensions of scale are defined as:

1. **Vertical Scaling**, sometimes referred to as scaling up, is higher up the ladder. It is institutional in nature that involves other sectors/stakeholder groups in the process of expansion – from the level of grassroots organizations to policymakers, donors, development institutions and investors at international levels.

2. **Horizontal Scaling**, sometimes referred to as scaling out, is the geographical spread to cover more people and communities and involves expansion within the same sector or stakeholder group. Others refer to it as a scaling out process across geographical boundaries. Achieving geographical spread is also realized through scaling down – increasing participation by decentralization of accountabilities and responsibilities particularly in breaking down big programmes into smaller programmes/projects (Committee Consultative Group on International Agricultural Research, 1999).

The authors argue that there exists a third layer of scale termed ‘scaling-in’ which is values and culture-based and not often identified, nor defined, in scalability research. Scaling-in provides depth to the framework and, when layered with vertical and horizontal scales, offers a three dimensional structure for scalability. Figure 2 illustrates
this multi-scale, nested framework composed of the three above-mentioned layers of scale.

Figure 2. Multi-scale framework

The framework illustrated in Figure 2 becomes the lens through which to examine the organizational (micro), geographical (macro), and values-based pre-conditions required to scale EfS projects. Decentralized, global networks are well placed to deliver EfS at scale due to their focus upon organizational and programme development across multiple scales. Decentralized networks are presented with a number of benefits of incorporating scale into their organizational and project-specific development and delivery. Subsequent monitoring and evaluation of their projects across the three previously mentioned scales may yield a more concise snapshot of programme effectiveness. Benefits of scale include the following five themes:

1. Identifying the strengths and weaknesses of projects;
2. Providing feedback to key stakeholders (e.g. project participants, funders, academic community, etc.);
3. Identifying the need for future projects and project areas;
4. Provide for the further development of the EfS body of knowledge in general; and,
5. Enable ongoing learning and improvement to the practice of EfS.

Benefits, challenges, barriers and opportunities to facilitating EfS are interwoven into many contrasting approaches to scalability and EfS delivery. The challenge for
decentralized networks is in identifying these barriers and opportunities early on in the process or as they materialize. This early identification will assist in ensuring that a strategy is in place to mitigate and/or adapt to challenges. An approach that takes into account the multi-scale, nested framework illustrated above could assist in systemizing decentralized, global networks approach to programme design and organizational development as it relates to the delivery of EfS.

### 3.5 Decentralized Global EfS Organizations

As indicated in previous sections, Decentralized Global Networks (DGNs) are an emerging mechanism for addressing systemic problems that have so far eluded smaller-scale approaches to sustainability learning. Due to their architecture they are well placed to link local and global scales through the application of enabling technologies, systems, and broader approaches to programme and organizational scope. However, there currently remains limited literature examining how decentralized networks operate as global organizations and how they facilitate EfS across scales — scaling up, out and in from local to international projects. Current research has focused on notions of ‘scaling up’ and suggests that educational programmes using this approach are often negatively associated ideas relating to mass production and marketing of particular products (Elias et al., 2003). By way of contrast, Elias et al., (2003) caution that the widespread implementation of effective EfS programmes require ‘thoughtful realism’ about how scaling programmes up, out and/or in can be ‘important, difficult, and possible’. Indeed, the up-scaling and mainstreaming of sustainability is a significant contemporary challenge and important questions about the myriad of issues associated with scaling EfS programmes have not been adequately addressed (IUCN, 2008).

International Non-Profit Associations (INPA) are representative of decentralized, global networks. Non-Profit Associations are, by their nature, diverse in market, offering, composition, financial throughput, and frequently, governance. Boris and Steuerle, as cited in Powell and Steinberg’s writings, indicate that non-profits play a varying degree of roles in society including drivers of social, economic, and political change.

They provide services as well as educate, advocate, and engage people in civic and social life. Given this diversity, conclusions about one type of non-profit organization do not translate easily to other types (Powell & Steinberg, 2006, p. 3).
The diversity of non-profit associations presents an inherent challenge in defining the sector, as there is often, not unlike the concept of sustainability, a profusion of terms used to characterize the range of institutions. These terms include ‘charitable organization’, ‘independent sector’, ‘voluntary sector’, ‘associational sector’, and ‘tax-exempt sector’ (Salmon & Anheier, 1997). Any specific connection with the above-mentioned definitional terms can lead to both a sense of ambiguity associated with the sector and confusion as to the objectives of the actors within the sector. Although, there is not the reach in this research to debate the scope, unit of analysis, or legality that comprises the non-profit sector, it should be noted that the definition of a not-profit is often regionally and/or internationally specific, presenting a set of challenges unique to global, decentralized non-profits. Specifically, the challenges associated with creating a consistent, organizational message both within the organization and across regional/national boundaries. An example is highlighted by the aims of the Environment and School Initiatives (ENSI), a globally recognized INPA. ENSI was established under the auspices of the Organization of Economic Cooperation and Development (OECD) as a network aligned with government levels. ENSI is focused upon the development, research, and dispersion of EfS and has traditionally used the term Education for Sustainable Development (EfSD) to identify the link between sustainability learning and the progress of social, environmental and economic development. ENSI provides an organizational approach, structure, and numerous project-based case studies investigated throughout this research and will be the lens through which INPAs are examined. One means for isolating the scope of an INPA is to identify its operational aims and objectives. ENSI’s operational aims include (Smith, 2004):

1. to create stable learning networks, which link schools, families, community and workplaces;
2. generate local knowledge and meaningful discourses concerning sustainable development to meet personal, social and economic needs within communities; and,
3. foster the democratic participation of students as active citizens in shaping the environmental conditions of their life and work.
Operational objectives include:

1. starting up, coordinating and supporting research and school development initiatives;
2. preparing publications with a view to inform the public about and propagate the aforementioned themes and activities;
3. promoting international exchanges and acquiring insights and knowledge, setting up forms of cooperation, including with other international organizations and programs; and,
4. preparing and providing policy recommendations and other advice, either or not solicited.

To provide further context, in 2001 ENSI became a decentralized international network, no longer linked to the OECD. This represented an opportunity for ENSI to establish itself as a strictly independent organization. As a consequence of the move to become an independent INPA, ENSI became less legitimized from the point of view of some governments. Meanwhile the European Union’s (EU) regulations' changed and only INPA’s institutions in the frame of, for example, the school systems, universities, and research bodies were eligible for EU grants. Given these restraints, ENSI had to become an INPA to maintain consistent levels of funding under ENSI’s current funding model. As a consequence, ENSI has ultimately ended up with two bodies: ENSI INPA and ENSI decentralized network. ENSI is a worthy example of the complexity often at play in decentralized global networks.

In some measure there is agreement that, at least in essence, not-profit associations can be defined as those that are organized for public purposes, are self-governing, and do not distribute surplus revenues as profits (Powell & Steinberg, 2006; Salmon & Anheier, 1997). However, there still remains a degree of vagueness surrounding the sector, and the tremendous variations that subsist in the kinds of institutions that exist on a global scale.

### 3.6 Conclusion

In 2009, as the UN-DESD was mid-term in its ten year mandate, participants were asking the following pertinent key questions relating to the impact of the UN-DESD: What will change as a result of the UN-DESD? What will be its legacy? (Mula & Tilbury, 2009). Today, as the UN-DESD wraps up the questions being asked are result oriented: how are current programmes measuring up? Which begs us to ask: are current programs
accomplishing enough to solve sustainability challenges? An ever-growing number of organizations have joined the debate and have begun to question and rethink the place that their organization is occupying and the role that they enact in society. Through this ongoing dialogue the concept of what constitutes a sustainable organization continues to develop and be enriched, particularly in ethical and social terms. Internally, a new organizational culture has emerged. This is a culture which recognizes that the people that the organization is composed of and the know-how that they generate are its main assets, given that the competitiveness of the organization depends on their capacity for action and innovation. Externally, organizations have begun to recognize themselves as integral parts of the communities where they operate and, as such, are jointly responsible for both the welfare and the problems of these societies, as well as being participants in the definition of their values. Emerging from this concept is the incorporation of the environmental variable into organizational strategy, along with the creation of economic and social value and with it a perceived requirement for the measurement of value created by this new found focus upon sustainability (Fricker, 1998).

The emergent theoretical framework is based on a review of existing literature and best practice examples of monitoring and evaluation frameworks in Australia and worldwide. Within this framework is the discussion of scalability and how it including, more centrally, how scalability is approached in programme delivery and organizational development. The proposed framework is consistent with the objectives identified in the Global Monitoring and Evaluation Framework Operational Plan (UNESCO, 2007) and builds upon the work undertaken by the Monitoring and Evaluation Expert Group (Tilbury, 2009). As indicated by Fricker (1998), it may be more appropriate now to ask how we measure up to sustainability as opposed to how we measure sustainability. In conclusion, it is with this question in mind that the argument can be made that scalability has the potential to offer numerous benefits for ongoing learning to enhance EfS objectives, and to assist decentralized global networks to provide a mechanism with which to provide effective EfS across scales.

References


Bellamy, J., Smith, T., Taylor, B, and Walker, M, (2004). Regional natural resource management planning arrangements: evaluating through the regional lens, in
Bellamy, J. (Ed) Regional natural resource management planning: the challenges of evaluation as seen through different lenses. Science Communications Unit, Natural Resource Sciences, Department of Natural Resources and Mines, QLD, pp. 27-34.


Parrish, B.D. (2007). Designing the sustainable enterprise. Sustainability Research Institute, School of Earth and Environment, University of Leeds, Leeds.


Publication Acknowledgement

The final, definitive version of this paper has been published in *Journal of Education for Sustainable Development*, September 2013 by Sage Publication India Pvt Ltd., All rights reserved.

Copyright © 2013 Centre for Environmental Education, Ahmedabad, Gujarat.
Chapter 4: Research Design
Chapter 4. Research Design

4.1 Introduction

The following chapter is an outline of the author’s philosophical/theoretical position, which has underpinned the design of this study. In addition, the research methodology, methods and process of data analysis employed are presented, and it is made clear how they will address the previously noted research gap of the facilitation of EfS by DGNs at organizational and program levels. In pursuit of methodological development, methods, and data collection techniques, the author has created a theoretical framework that is the foundation of this study and, of necessity, frames the research questions within it. In the exploration of a theoretical framework ‘three requisite clarifying principles’ aid in making clear the philosophical perspective with which the research aligns, and will reveal the influences coming to bear upon the authors epistemological orientation, view of the world, and acquisition of knowledge (Howe & Eisenhart, 1990). Clarification of these aspects of the research design helps to satisfy the research principles identified as important to maintaining an appropriate standard of research. This involves: i) understanding one's values through alertness to, and coherence of, background assumptions; ii) congruity between research questions and design; and, iii) the effective use of relevant data collection and analysis techniques (Howe & Eisenhart, 1990). In practice, it is worth unearthing the reasons and assumptions underpinning each choice made to ensure there will be transparency, and to clarify why particular methodologies are favoured, or are believed to lend themselves favourably to the research questions being pursued.

In addition, this Chapter identifies the process through which the research questions have been aligned to the various methods, and how each of the data sets addresses the research questions posed by the study. Reflection on how the methodology relates to key concepts and viewpoints derived from earlier research encountered in the literature review is examined, thereby providing direction as to how the data is translated into the theoretical framework and how this process assists in answering the research questions. The qualitative and quantitative methods (e.g. interviews, case studies and survey) and an overview of the data gathering techniques and analysis are also discussed and given credence via an explanation of the methodological biases. This chapter focuses attention on why specific methods have been selected, how ethics are addressed in each stage of
the study, and how the methods selected examine the perceived theoretical gaps by identifying the categories and networks of relationships that are developed to systematically read the data and to make claims from that data.

4.2 Philosophical Position

In the study of human affairs there exists two types of knowledge (Flyvbjerg, 2006). Firstly, there is context-independent knowledge, which is the kind of knowledge that forms the basis of textbooks and computers. If people were exclusively trained in context-independent knowledge and rules, they remain at the beginner’s level in the learning process. Secondly, there is context-dependent knowledge which can move a researcher of social sciences from beginner and generalist to expert with intimate knowledge (Flyvbjerg, 2006). These two knowledge types are conducive to epistemic theoretical construction. Knowledge can also be classified as ‘a priori’ knowledge, which is obtained without needing to observe the world, and ‘a posteriori’ knowledge which is only obtained after observing the world or interacting with it in some way (Dancy & Sosa, 1992). Therefore, the author identifies that the distinction between a priori and a posteriori knowledge broadly corresponds to the distinction between empirical and non-empirical understanding. Both veins of knowledge underscore and inform the epistemological approach in which the author has constructed this study and further investigated the subject. However, a distinctly context-dependent and non-empirical (i.e. a posteriori) focus is most central to the conclusions drawn from this research and the subsequent contributions to theory. This approach is discussed further in this Chapter and relates in part to the application of inductive and deductive analysis applied in the course of this study.

Concurrent to the processes of obtaining knowledge is the active process of knowing and observing the world. Intrinsically, this includes the ability to know that and to know how, each of which contribute to a conceptual reference point for the author’s own construction of knowledge. In the development of this methodological approach the distinct differences between propositional (i.e. that) knowledge, for example, knowing that one plus one equals two, and procedural (i.e. how) knowledge, for example, knowing how to add two numbers together to obtain an answer were identified as theoretically important. It is fundamental to identifying the key elements of this theoretical framework that this research identify and expand upon procedural knowledge, and not just
propositional knowledge, from both macro (i.e. organizational) and micro (program) perspectives. Drawing on a posteriori classification and procedural focus, for instance, the research attempts to discern how obtaining program funding becomes a significant challenge for DGNs and not simply that funding is a challenge, which is already widely described and accepted in the literature (Duggan, Smith, & Thomsen, 2015a).

Integral to this research is the requirement for a theoretical framework with which to guide the inquiry and which is also cognizant of the dominate research paradigms in which to examine the research questions. Traditionally, the study of environmental education, which is the field from where this research originated, has employed three research paradigms: positivism, interpretivism, and critical science (Fien, 1993b; Robottom & Hart, 1993). Interpretive researchers seek understanding of the meanings of perceptions, experiences, and actions, and recognise that knowledge is both subjective and socially constructed (Carr & Kemmis, 2003). This differentiates the interpretative approach applied in this research from that of, for example, positivism and critical science. The positivist tradition, one can say, seeks to explain, predict and control (Carr & Kemmis, 2003). Information and knowledge gained from positivist research is characteristically quantitative (Thomsen, 2008). According to Carr and Kemmis (2003), within this paradigm the researcher strives to take an objective view of reality and believes that 'truth' can be determined by maintaining a detached stance. On the other hand, researchers employing the critical science approach in their work can be said to take an emancipatory interest and seek social change (Robottom & Hart, 1993). Table 18 identifies the key aspects of these three contrasting approaches differentiating one from the other.
Table 18. Contrasting views underlying alternative research paradigms

<table>
<thead>
<tr>
<th>Underlying assumptions and beliefs about:</th>
<th>Positivism</th>
<th>Interpretivism</th>
<th>Critical Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose(s) of research</strong></td>
<td>Discover laws and generalisations which explain reality and allow to predict and control</td>
<td>Understand and interpret daily occurrences and social structures as well as the meanings people give to the phenomena</td>
<td>Emancipate people through critique of ideologies that promote inequity and through change in personal understanding and action that lead to transformation of self-consciousness and social conditions.</td>
</tr>
<tr>
<td><strong>Nature of reality (ontology)</strong></td>
<td>Single, givens, fragmentary, tangible, measurable, convergent</td>
<td>Multiple, constructed through human interaction, holistic divergent</td>
<td>Multiple, constructed through human interaction, holistic divergent, social and economic; embedded in issues of equity and hegemony.</td>
</tr>
<tr>
<td><strong>Nature of knowledge (epistemology)</strong></td>
<td>Events are explained based upon knowable facts, real causes or simultaneous effects; law-like regularities exist</td>
<td>Events are understood through mental process of interpretation which is influenced by and interacts with social context</td>
<td>Events are understood within social and economic context with emphasis on ideological critique and praxis.</td>
</tr>
<tr>
<td><strong>Relationship between knower and the known</strong></td>
<td>Independent, dualism</td>
<td>Interrelated, dialogic</td>
<td>Interrelated, influenced by society and commitment to emancipation</td>
</tr>
<tr>
<td><strong>Role of values in research</strong></td>
<td>Value free</td>
<td>Value bounded</td>
<td>Value bounded; ideological critique and concern for inequities</td>
</tr>
</tbody>
</table>

(Cantrell, 1993)
An interpretative research approach was adopted throughout this study. The selected research approach emphasises the need to understand and describe meaningful social action and is valued as an appropriate methodology for the exploration of the facilitation of EfS as a result of its dialogic and value-bounded attributes, both of which are integral to the concept of EfS in general.

### 4.3 Theoretical Framework

The research framework is constructed predominantly from a global, multi-scale theoretical standpoint. As such, it focuses on understanding social and organizational systems in order to address issues associated with multiple scales and the facilitation of EfS (Duggan, Smith, & Thomsen, 2013). The framework is assembled from an interpretive and constructivist perspective whereby the research draws on literature from ethics, sustainability learning, scalability, globalization and monitoring and evaluation literature to understand and critique the facilitation of EfS by DGNs at organizational and program levels.

As indicated in the previous chapter there is a paucity of literature available that investigates the scalability of EfS programs and the organizations that facilitate these programs. The lack of research in this area serves to highlight the detached worlds of research and practice, and the gap that exists in the knowledge base generated from research into scale (Catacutan, 2005). The study of scalability is characterized by a convergence of multiple realities, simultaneously driven by human interaction and value-bounded by the nature and values characteristic of the interpretivist approach. Understanding the inter- and intra- relationships between macroscale and microscale phenomena and processes is one of the significant intellectual challenges faced by a multitude of scientific disciplines (Wilbanks & Kates, 1999; Wilbanks & Reid, 2006). Epistemologically, scalability recognises that the application of theory is shaped and interpreted by the exploration of the findings of a number of different fields relating to the notion of scale. [Nor is it]…‘ uncommon to explore applications of findings in one field about how scale matters as a possible hypothesis for another’ (Wilbanks & Reid, 2006, p. 24). The relationship to scale of globalization and social practice is an example of fields that are intrinsically linked (Fløysand, 1999), specifically, in the identification of multi-scale approaches to community and social interactions across cultural, geographical and political/governance scales as was examined in this study.
The research framework used here is multi-scale and nested, the concepts of which were developed in detail within Chapter 3. Given these parameters, the research focuses on an understanding of the impact of scale upon EfS facilitation, and the identification of multi-scale approaches to the challenge of scaling up, scaling out and scaling in of EfS programs, referencing the organizations (i.e. DGNs) that deliver these approaches across these multiple levels. The framework becomes the lens through which to examine the organizational, geographical, and values-based dimensions and pre/existing conditions required to appropriately scale DGNs and the EfS programs they facilitate (Duggan et al., 2013).

As previously discussed in the literature review, the lack of substantive research into scalability has been problematic and the result of an apparent lack of importance placed upon scale by both research and developmental organizations (Catacutan, 2005). The author of the study presented here argues that DGNs are in fact presented with an opportunity when incorporating scale into their organizational and program specific development and delivery, and that the study of these opportunities, and the challenges inherent in realizing these prospects, are categorically worthy of a research focus. Furthermore, an understanding of the impact of scale upon EfS would potentially make a relevant contribution to the development of monitoring and evaluation frameworks which incorporate the three previously mentioned scales (i.e. Up, Out, In) and therefore yield a more concise snapshot of program effectiveness (Duggan et al., 2013). There are methodological implications relating to the implementation of the multi-scale theoretical framework adopted for this research. The author applied a mixed method approach inclusive of analysis at organisational and program levels to examine the multi-scale dimensions. These approaches will be explored in further detail in the sections to follow.

4.4 Research Methods and Process

Informed by the overarching methodology, participant observation, document analysis, key informant interviews and a survey questionnaire were used to examine a DGNs facilitation of EfS at both the organizational and the program levels. A multi-perspective approach to analysis is applied whereby the researcher considers not just an individual perspective, but the perspective of multiple participants and groups, including the interactions between them (Feagin, Orum, & Sjoberg, 1991). Building on this approach, multiple sources of data (e.g. documents, interviews and surveys) were
examined in a triangulated approach to identifying the connection between the cases and the research framework (Yin, 1995). The research design, including the connection between the elements of data collection and analysis, is presented in Figure 3.

**Figure 3. Research Methods**

As illustrated in Figure 3, the initial document review and analysis was intended to provide context and direction for the development of interview questions employed during the key informant interviews (refer Appendices three and four). Responses provided by the informants were then incorporated as drivers for the development of survey questions (refer Appendix five) to be provided to a wider audience, including the members of other DGNs who facilitate EfS. As indicated, one organizational and four program case studies were produced through the application of each of the four methods. Stratified, purposive sampling of case studies is utilized whereby the researcher initially identified subgroups (i.e. EfS facilitators) of the larger sample (i.e. DGNs) and then selected cases from the subgroup in a purposive manner (Patton, 1990; Teddlie & Tashakkori, 2009). The program-based case studies were selected and analyzed with the data referring to each case compared to the other cases using pre-determined units of analysis (refer to Section 4.7). The comparative analysis of program cases was undertaken to draw connections between the dimensions identified in the case studies, and to aid in
drawing out points of similarity and contrast. The process of comparative analysis incorporated pattern matching. Pattern matching is characterized by linking logic to purpose through the process of analyzing several pieces of information (e.g. cases) and connecting them through a theoretical framework (Yin, 1995).

The program case studies are an attempt at examining large-scale patterns and trends. However, it is acknowledged that this approach runs the risk of these trends existing outside of the individuals who enact them on the ground. Program level case studies are applied to individual interactions allowing for on-the-ground analysis, but in and of itself it can fail to consider the larger forces that influence individual behaviour (Ritzer & Goodman, 2001). For this reason, an organizational case study was also conducted to ensure the macro-level dimensions of a DGNs facilitation of EfS were captured. The Environment and School Initiatives (ENSI), as an example of a DGN, was selected as the organizational case study. In chapter five the author examines each case study (i.e. ENSI and some of its projects) through the lens of the multi-scale framework. In addition, Appendices 10 and 13 include an in depth review of each case providing an overview of objectives, milestones, facilitation methods and outcomes as they relate to the DGNs and each program examined.

Individually, the methods have each been selected to address one or more of the research questions. Table 19 identifies and unpacks the research design describing how each method will be applied to the collection of data, the analytical approach applied and the contribution it makes to providing answers to the research questions.
### Table 19. Mixed Method Approach

<table>
<thead>
<tr>
<th>Research Phase and Data acquired</th>
<th>Data collection approach</th>
<th>Analytical approach</th>
<th>Contribution to research questions</th>
</tr>
</thead>
</table>
| **Case Study – Organizational**  | *Step 1*: document analysis to examine a DGNs (i.e. ENSI).  
*Step 2*: 9 Key informant interviews.  
*Step 3*: Online survey questionnaire to examine the DGNs organization. | Qualitative content analysis utilizing NVivo to establish the operating contexts of ENSI including organizational governance structures and program delivery processes across geographical, organizational, and cultural dimensions | An understanding at the organizational level of the six dimensions of effective EfS facilitation by a DGNs. |
| Information about a DGN as an organization and facilitator of EfS. | | | |

| **Case Study – Programs** | *Step 1*: document analysis to examine DGNs programs.  
*Step 2*: 8 Key informant interviews.  
*Step 3*: Online survey questionnaire to examine DGNs programs. | As above. Data from the interviews and questionnaire are examined through a data triangulation process. | An understanding at the program scale of five dimensions of effective EfS facilitation by a DGNs. |
| Four EfS Programs facilitated by a DGN are examined. | | | |

| **Synthesis of Phase 1 and 2 data** | All data and the dimensions identified in two journal articles is examined. | A an examination of the 6 organizational and 5 program level dimensions of a DGNs facilitation of EfS. | The synthesis provides an understanding of the challenges and opportunities DGNs face in facilitating effective EfS across numerous scales. |
| Challenges and opportunities for EfS facilitation. | | | |

Section 4.6 will examine each data collection method in more detail.
4.5 Case Study Approach

The selection of a single leading case study and multiple program case studies was chosen as the primary approach to the data gathering strategy applied in this research. The case study approach is in and of itself exploratory, applying theoretical frameworks to the examination of phenomena within their own context and from amongst a variety of data sources (Baxter & Jack, 2008). The significant epistemological assumption underpinning the selection of the case study approach is that something beneficial can be learned from considering and understanding the specificities of a particular case or group of cases. Although in the past, case study has been viewed as a somewhat ‘soft’, less rigorous research option, Yin argues that unexpectedly, the laxer a research technique, the harder it actually is to deliver and that case study research is unusually difficult (Yin & Hills, 2003). It is beyond doubt that theory plays a central role in interpretive social research. However, although use of theory performs an important task in the case study approach, case study research is more focused on the formation of concepts, elaboration and refinement than the specific testing of theory (Ragin, 2003). Traditional views postulate that case studies ‘have such a total absence of control as to be of almost no scientific value; whereby, any appearance of absolute knowledge, or intrinsic knowledge about singular isolated objects, is found to be illusory upon analysis’ (Campbell & Stanley, 1963, pp. 6-7). As a result of their experiential and opportunistic nature, case studies are often generalised as providing unreliable information about the broader class (Hill, Abercrombie, & Turner, 2000) and valueless in and of themselves. This claim is refuted as one author posits:

Concrete experiences can be achieved via continued proximity to the studied reality and via feedback from those under study. Great distance to the object of study and lack of feedback easily lead to a stultified learning process, which in research can lead to ritual academic blind alleys, where the effect and usefulness of research becomes unclear and untested. As a research method, the case study can be an effective remedy against this tendency (Flyvbjerg, 2006, p. 224).

As indicated, case studies can be qualitative and quantitative and can be employed by positivist, interpretive and critical researchers (Scapens, 2004; Stake, 2003). Having considered the characteristics of each research paradigm during the theoretical development of this study, the researcher settled upon exploratory and interpretive
paradigms and the application of qualitative case study strategies for data collection and presentation.

An exploration of the pertinent literature relating to the nature of case studies and offering contributions from multiple viewpoints has informed the approach adopted in this research. The interpretive approach was chosen to assist in making sense of and exploring emergent issues presented through the case studies in an attempt to uncover social aspects of humanity that may be lost through objective inquiries (Kelliher, 2005). The configuration of case studies may be in single or multiple-case designs. A multiple design differentiates itself from a single case in that it must follow replication rather than sampling logic (Tellis, 1997). If there are no other cases available for replication then the researcher is limited to a single-case design. As indicated, this research is investigating a single, organizational case and multiple program case studies. Yin (1995) indicated that the generalisation of results from either single or multiple designs are most often extended to theory and not to populations. Multiple cases work to strengthen the results through replication and pattern-matching, thereby increasing confidence in the robustness of the theory (Tellis, 1997). The literature indicates that case studies can be variable depending upon a number of factors which include the research purpose, methodological paradigm and data collection methods (Haigh, 2000). Sample size, for example, may be determined by the studies purpose and within the constraints of time and resources. Given the constraints imposed on this research (i.e. geographically broad programs, longitudinal period of delivery, access to key documents in multiple languages, etc.) it was appropriate to select cases based upon information-richness and the capabilities of the researcher than to focus too intently upon sample size (Patton, 1990). As such, the selection of a single, leading case study and multiple program case studies is appropriate as a primary approach to data gathering applied in this research.

Yin (1995) and Stake (1995) have suggested that the process of selecting case studies provides the researcher with the opportunity to take advantage of what can be learned. It is noted that cases that are selected should be easy and willing subjects and that a strong instrumental case is not required to defend its typicality (Tellis, 1997). Case studies tend to be quite selective, ensuring focus upon one or two dimensions that are fundamental to the overall understanding of the theoretical framework being investigated. To be certain that substantive data would be harvested, case study selection necessitated focusing attention solely upon a DGN, and that organizations’ programs from which primary and
secondary data could be collected and analyzed, inclusive of those program cases in which data collected would be clearly identified as important to the overall understanding of the theoretical framework (Tellis, 1997). In addition, to narrow the scope of programs investigated to the four cases selected required program participants with a willingness to provide information which was to be tested through the use of a selective approach involving the application of four criteria (Stake, 1995; R. Yin, 1995). The case study selection criteria identified to achieve these aims included: i) access to program managers; ii) access to pedagogical and/or senior advisors; iii) access to program evaluation report(s); and, iv) binding the selection of cases by time and activity. Specifically, in relation to the fourth criteria, the timeframe in which the DGNs programs were delivered (i.e. over 2-5 or more years), and the historical nature of many of its programs (i.e. conducted in the 1980s, 1990s and 2000s) necessitated the selective use of the timescales in which program data was available to be collected. Binding the selection of cases by time and activity was identified as an appropriate means of narrowing the field of cases available by the DGNs (Stake, 1995; Yin, 1995). The UN-DESD was adopted as an appropriate timescale and period of EfS facilitation (i.e. activity) in which to bind the cases and enable assessment of programs delivered pre-, during and late UN-DESD. This, in conjunction with the application of the other above mentioned criteria assisted in narrowing the field to the four criteria seen as relevant to this study. It is appropriate to mention here that this approach was iterative beginning with observational participation and document analysis, the learnings of which were then utilized to prepare interview questions and applied through an in-depth interview of key informants. A survey tool was subsequently prepared and applied to highlight issues felt to be important to those individuals being interviewed. The case studies became a product of the combined interpretation of data collected throughout these three phases. The tools identified immediately above, the four criteria and the selection of cases will be discussed in further detail in the sections to follow (i.e. Section 4.5.1 and 4.5.2).

4.5.1 Case Studies

As identified previously, DGNs are recognized as playing a role in EfS program delivery through engagement and broad consultation of wide-ranging participant groups (Duggan et al., 2013). DGNs have emerged as facilitators of EfS that actively engages local and international networks encompassing a range of participants that are inclusive
of teachers, teacher-educators, researchers and policy-makers (Duggan et al., 2015c; Smith, 2004). The Environment and School Initiatives (ENSI) is an example of a DGNs that delivers programs which address the inherent complexity of EfS facilitation at the implementation level. ENSI has been operational for over 26 years and has implemented 15 major EfS programs with budgets in excess of €50,000, each program lasting longer than 12 months in duration and successfully delivered in over 25 countries (Duggan et al., 2015c). ENSI is currently engaged in the final stages of implementing two additional major European programs (i.e. Collaboration of Schools and Communities for Sustainable Development, CoDeS and Engaging Research on Ecologically Sustainable Development) that will be widespread across multiple countries involving hundreds of participants. All of the above mentioned programs spanned multiple years throughout ENSI’s history and presented the opportunity to gain insight into their facilitation of EfS over a significant timescale.

The ENSI DGNs and four program case studies were examined to generate understanding of the dimensions characteristic of a DGNs facilitating effective EfS at multiple scales. The application of organizational and program case study analysis is appropriate for this research in that it provides both a macro (i.e. organizational) and micro (i.e. program) level examination of the key aspects of a DGNs, from both the perspectives of governance and implementation which clearly align with the research theoretical framework proscribing a systemic and holistic examination of cases at organizational, geographical and culture/values-based scales. The approach affords the researcher the opportunity to gather data from interrelated sources, inclusive of key informants, survey respondents, and case study contributors, as previously indicated in the chapter illustrating the research methodology. ENSI is examined at organizational and program scales to elicit a snapshot of the facilitation of EfS through the lens of the theoretical framework (i.e. global, multi-scale framework), as identified in Chapter three, taking into account the nested externalities associated with scaling organizational and program EfS.

4.5.2 Case Study Selection Criteria

As a result of the sheer volume of data available and the geographical scale of the programs made available for case studies, the researcher settled on a set of criteria in which to select projects to analyze and compile into cases. As indicated previously, the
criteria included: i) access to a program manager/key informant(s); ii) access to a country coordinator and/or senior advisor in office during the programs implementation; iii) access to program evaluation/progress reports complied by ENSI and, preferably, third party review; and, iv) program representative of an identified ‘Wave of ENSI’ and time-bounded by the UN-DESD. The ENSI projects identified in Table 20 qualified as representative of all four selection criteria taking into account the focus on the third and fourth Waves of ENSI and the period marked by the UN-DESD.

**Table 20.** Selected ENSI Case Study Projects

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Manager</th>
<th>Country Coordinator/ Senior Advisor</th>
<th>Evaluation/ Progress Report(s)</th>
<th>Wave of ENSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learnscapes</td>
<td>Available for interview.</td>
<td>Learnscapes Evaluation Report prepared for ENSI Executive at conclusion of the project.</td>
<td>Pre-DESD project (1998 – 2004 then extended into the LEARN project completing in 2010) and strongly linked to the CoDeS project.</td>
<td></td>
</tr>
<tr>
<td>Comenius Lifelong Learning Programme (SUPPORT-)</td>
<td>Available for interview.</td>
<td>Both ENSI Evaluation and external (EAC-EA) Final Assessment Report at conclusion of the project.</td>
<td>Mid-DESD project (2007-2010)</td>
<td></td>
</tr>
</tbody>
</table>
Table 20. Continued.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Manager</th>
<th>Country Coordinator/ Senior Advisor</th>
<th>Evaluation/ Progress Report(s)</th>
<th>Wave of ENSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaboration of Schools and Communities for Sustainable Development (CoDeS)</td>
<td>Available for interview.</td>
<td>Available for interview.</td>
<td>Progress Reports provided. Final Evaluation Report to be prepared at conclusion of the project incorporating progress reports.</td>
<td>Late-DESD project (2011 – 2014)</td>
</tr>
</tbody>
</table>

It is worth noting that in early discussions with the ENSI executive during the participant observation phase of data collection, and through further investigation during document analysis it was determined that obtaining key informant interviews and/or written material representative of projects from the first and second Waves of ENSI (i.e. 1986 – 1994) could be difficult due to the retirement, geographical distance from, and/or death of project managers and country coordinators. In addition, early documentation was not available in electronic format within ENSI’s document repository nor could it be located in hard copy format for review. Thus, the researcher made the determination to focus efforts on the third and fourth Waves of ENSI (1995-2014) which represented the opportunity to focus the case studies upon the pre-DESD, early, mid, and late-DESD periods characterized by these Waves. This process is expanded upon within the description of the application of methods identified in Section 5.3.2.

With the exclusion of the ENSI organization which will be examined from an organizational viewpoint in Section 5.3.1 and expanded upon in the case study in Appendix 10, each program case will undergo comparative analysis and be presented in Section 5.3.2. In addition, the program cases will be utilized to illustrate the dimensions of a DGNs facilitation of EfS at a program level. Section 5.3.3 will extend further upon the case study analysis identifying the challenges and opportunities facing DGNs. The program case study overviews, examination of program deliverables and facilitation methods, and identification of outcomes inclusive of a brief discussion are presented in further detail in Appendix ten.
4.5.3 Ensuring Research Rigor

The author has included several strategies within this study that improve the credibility and trustworthiness of investigation and are believed to enhance the rigor of qualitative research. Incorporating the strategies described below are thought to enrich the perceived relevance, transparency, validity, reliability, comparativeness and reflexivity of the research (Saumure & Given, 2008). For example, a common situation that arises in case study research can occur where captured data is accumulated but never analyzed to draw out meaningful features and trends expressed in the data. This may occur when the relevance and applicability of any particular data is unknown but, of course, depends entirely on the data to be analyzed and the particular purposes and predilections of the individual researcher (Dey, 2003). To assist in identifying the relevance and applicability of data, Yin (1995) presents a model inclusive of five categories considered important to the development and analysis of case studies include the:

1. research questions;
2. purpose;
3. unit(s) of analysis;
4. logic linking the data to the purpose; and,
5. the criteria for interpreting the cases.

Table 21 offers an overview of the research design components described above applied to the analysis of the case studies here documented. These components provide structure to ensure a rigorous approach to data analysis is applied through a focus upon analytical content, process and outcomes. These are further deconstructed in the section discussing comparative analysis (i.e. Section 4.7.2).
<table>
<thead>
<tr>
<th>Process Step</th>
<th>Content</th>
<th>Process</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Questions</td>
<td>Research questions applied as identified in Chapter 1.3</td>
<td>Apply theoretical framework to the case study</td>
<td>Interpretation of the analysis and data.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Definition of the phenomena under investigation (what is it?)</td>
<td>Identification of organizational program case study analysis and other documents.</td>
<td>Structured approach to case study and document analysis.</td>
</tr>
<tr>
<td>Unit(s) of analysis</td>
<td>Examination of case study and document analysis criteria.</td>
<td>Identify the criteria that will address the research questions.</td>
<td>Case study and document data collected in such a manner as to address the research question(s).</td>
</tr>
<tr>
<td>Logic</td>
<td>Pattern-matching</td>
<td>Several pieces of information are connected (e.g. triangulation) to the theoretical framework.</td>
<td>Identification of the link between the data collected and research questions.</td>
</tr>
<tr>
<td>Criteria</td>
<td>Criteria for interpreting the findings</td>
<td>Identification of criteria for monitoring and evaluation</td>
<td>Synthesis of data through triangulation contributing to key findings.</td>
</tr>
</tbody>
</table>

(Adapted from Yin, 1995).
As indicated in Table 21, data triangulation occurs as a final step in the analysis and development of each case to facilitate the synthesis of the majority of data collected, thereby assisting to identify holistically the organizational and program dimensions of EfS facilitation and the challenges and opportunities DGNs face (Figure 4).

![Figure 4. Triangulation of data](image)

All data analysis and triangulation conducted utilized the Nvivo and Leximancer data analysis tools. Data was coded using NVivo and relationships between codes were validated using Leximancer.

In conjunction with the data analysis tools mentioned above a research journal that documented each stage of the research process was kept by the researcher and used to record shifts and changes in ideas and approaches as they arise (Bradshaw & Stratford, 2005). The gathering of case study data included the use of appropriate checking mechanisms such as member checking and, as indicated above, includes triangulation to ensure a fair representation of participants’ views (Baxter & Eyles, 1999; Bradshaw & Stratford, 2005). Moreover, the independently reviewed and published journal articles that comprise the bulk of the literature and results chapters in this thesis offer further assurance that the content underwent significant academic scrutiny.

Ultimately, in agreement with the interpretive paradigm that has been followed in this study, the application of a rigorous, constructivist approach to the research underpinned by reflexivity, which is a constant, critical introspection and self-conscious scrutiny of my role as researcher within the research process (England, 1994). This principle extends beyond the ethical review process to critically examine the researcher’s role in the social context of the research process, particularly in the way power intersects with it (Dowling, 2005). Chapter six includes a reflection upon the research process which expands upon the role of the researcher in formulating and conducting this inquiry.
4.6 Data Collection Methods

The division between qualitative and quantitative data collection methods has become a staple of debate in the social sciences. ‘Qualitative data is characterized as being soft social science, dealing with inadequate evidence. In contrast, quantitative research is considered to be hard-nosed, data-driven, outcome-oriented, and truly scientific’ (Yin & Hills, 2003, p. 33). ‘The qualitative approach uses small, information-rich samples selected purposefully to allow the researcher to focus on issues important to the study. Whereas, the quantitative approach involves representative samples that allow the researcher to generalise to a larger population. For the latter, once established, the same sample is used for the duration of the study. For the former, samples change throughout the study through serial selection (i.e. one sample leads to another) in order to extend, test, and fill in information’ (Lincoln & Guba, 1985, p. 201). Both methods were applied in this research, although the primary focus will be upon qualitative analysis.

As indicated, the study employed four data collection methods. These methods included: observational participant; document analysis; key informant interviews; and, a survey (Table 22).

Table 22. Data collection methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Data Source</th>
<th>Analytical Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document Analysis</td>
<td>ENSI constitution, strategic plans, meeting minutes, newsletters, project proposals, evaluation reports and research articles.</td>
<td>Qualitative content analysis utilizing NVivo to establish the operating contexts of ENSI including organizational governance structures and program delivery processes across geographical, organizational, and cultural dimensions.</td>
</tr>
</tbody>
</table>
### Table 22. Continued.

<table>
<thead>
<tr>
<th>Method</th>
<th>Data Source</th>
<th>Analytical Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key informant interviews</strong></td>
<td>ENSI’s organizational leaders (Executive, Country Coordinators, and Critical Friends) and Program Managers including those based in Europe and Australia.</td>
<td>Deductive thematic analysis using eight themes derived from phase 2, namely: 1) accountability to stakeholders; 2) network development; 3) roles in EfS facilitation; 4) governance structure; 5) network democracy; 6) relevance to participants; 7) complexity of the learning network; and 8) scalability. Data was coded using NVivo and relationships between codes were validated using Leximancer.</td>
</tr>
<tr>
<td><strong>Survey Questionnaire</strong></td>
<td>Online survey questionnaire of organizations representing over 60 countries and 1000’s of network members. The survey recipients were identified as facilitators of EfS at a leadership and/or project manager level through their roles as members and/or affiliates of the ENSI and FEE DGNs.</td>
<td>The survey extended and deepened insights generated in the first three phases and focused on the approaches to facilitating EfS at multiple scales applied by DGNs at an organizational level.</td>
</tr>
</tbody>
</table>

(Duggan, Smith, & Thomsen, 2015c)

Participant observation and document analysis provide a broad and structural overview of key information and the issues implicated in the facilitation of EfS, specifically as they relate to the research questions and theoretical framework underpinning this research. Four cases, one organizational and four programs, were analyzed to provide an understanding of programs undertaken and relevant stakeholders, including observation of the roles and the nature of interaction. A survey (i.e. questionnaire) provided a broad overview of the program specific data relevant to the facilitation of EfS, supplemented by key informant interviews and researcher observation, all of which were then applied to capture specific aspects of the individual cases.
4.6.1 Participant Observation and Document Analysis

In this study, the use of participant observation and document analysis enabled an understanding of the dimensions associated with the facilitation of EfS by DGNs and the programs they deliver. The collection of research data commenced with participant observation, whereby the researcher attended the ENSI Annual General Meeting (AGM) in September 2008 as an observer and was afforded the opportunity to identify key documents and informants through interaction with the Executive of the ENSI DGN. Organizational and program documents collected provided the researcher with the opportunity to analyze the unique key issues and challenges presented by the ENSI case.

The researcher examined archival operational documents and studies, including the DGNs geographically dispersed operational and governance structure, identifying for example, indicators used to monitor and evaluate organizational development and program delivery. Due to the logistical challenges of the DGNs dispersed programs and geographical reach, which made visiting each program site difficult for the researcher, a desktop analysis of detailed program planning and reports was conducted. Documents were examined to identify the repetition of ideas and wider themes. Organizational and program case studies were developed and a comparative analysis of the DGNs as facilitator of EfS at the program level was conducted using the four program cases.

Access to information and key informants for participant observation regarding the DGNs organizational and program history was provided by the DGN’s Executive Committee. Every effort was made to ensure a comprehensive approach to document analysis at both levels. Appendices Six and Eleven identify the key organizational and program documents reviewed throughout the course of this study.

4.6.2 Key Informant Interviews

Semi-structured interviews were conducted with key informants representing the ENSI DGNs and EfS programs. Key informants included: Executive Members, Country Coordinators, critical friends (i.e. former ENSI network members), pedagogical coordinators and program managers. The organizational key informant interviews were conducted between September 2008 and August 2013 and the program-specific interviews between February 2012 and April 2012. Each interview lasted between twenty-five and sixty minutes (refer to Appendix Seven and Twelve). Due to the
geographical distance between the researcher and the key informants interviews were conducted via an online communication medium (i.e. Skype).

The interviewing technique applied was based on recommendations regarding a recursive model of interviewing entailing minimum structure during interview delivery and, therefore, the ability to obtain a greater breadth of data (Minichiello, Aroni, & Hays, 2008). Organizational and program interview questions remained uniform across all interviews (refer Appendices three and four); however, interviewees responded based on their interpretation of the questions, and the interviewer encouraged and prompted discussion via progressive questioning regarding key aspects of the responses provided.

Interviews were recorded with participant written permission and later transcribed and stored in NVivo. Three pilot interviews were conducted at the commencement of the process with key informants self-identified as EfS facilitators. Feedback on research questions, structure and application of the method was sought from these first three informants and learnings utilized to refine questions and interviewing approaches. Transcripts of all interviews were subsequently coded using Leximancer in order to extract in more detail the key themes and to identify the links between these themes. Appendix five provides an overview of the raw word identification generated through Leximancer (i.e. word identification map) and highlights the raw word and conceptual links across program interviews. There were a number of words/phrases (e.g. Mike-my name, doing, year, things, time, etc.) included in the interview transcripts and these were not deemed to have importance to the data analysis process. As such they were moderated out during the data analysis process due to these showing little relationship to the research questions. Thus, the data that was collected and used through these interviews was reflected in the case studies and can be seen to include information pertaining to key activities, motivations, drivers and outcomes of participation, reflection on experiences, and insights into differing opinions and debates regarding both DGNs and the EfS programs implemented.

4.6.3 Survey

The survey was designed as the third phase of data collection in this interpretive process, whereby, document analysis and interviews, aided by the development and application of a code manual (refer Section 4.7) steered the development of the survey instrument and questions. The survey method was applied in this research to assist in
identifying the degree to which emerging themes, identified through analysis of phase one and two data (i.e. document analysis and organization and program key informant interviews), were considered relevant and prevalent amongst facilitators of EfS. The objective of the survey was to discern the relationships emerging from the themes developed through the analysis of previous data collection phases, and to establish any hidden issues that may not have surfaced in interviews of key informants directly involved with ENSI.

The survey was made available to 60 countries with EfS network memberships representing 1000’s of EfS facilitators and DGNs participants. The survey was distributed through an online distribution, collection and data presentation tool (i.e. Survey Monkey). Non-random sampling of participants was applied to advance the exploratory work through the purposeful targeting of groups within the defined population of EfS facilitators and DGNs membership. This sample was obtained by utilising the membership lists provided for ENSI and the Foundation for Environmental Education (FEE-). The focus of the survey questions was quite emphatically upon a DGNs facilitation of EfS as opposed to the EfS programs which were covered more specifically within the document analysis and interviews phases. Respondents were asked 18 questions and the majority of survey questions utilised a ranking system of 1 (indicating the role considered most important) to 6 (indicating the role considered least important). A number of questions also requested open-ended responses prompting respondents to add further support for their responses to the ranked questions. Appendix 11 identifies the alignment of survey questions the code manual and presents an overview of survey results.

The challenge of a low survey response rate was noted and is dealt with in further detail in the results chapter (Section 5.2.2). Regardless of a low response rate the characteristics of respondents were considered representative of the wider sample across the two dimensions central to this study (i.e., DGNs membership and facilitation of EfS). Therefore, the data collected from this sample was considered sufficient enough in which to draw findings (Dey, 1997; Dillman, 1991). The survey questions are provided in Appendix 14.
4.7 Data Analysis and Interpretation

The research findings discussed in subsequent chapters originated from the analysis of data collected through the methods established in the preceding sections of this Chapter. As identified previously in the literature review, the concepts that frame the theoretical components of this research (i.e. scalability, education for sustainability, globalisation, etc.) are largely conceptual and, in many cases, the result of the interaction of social phenomena. Sayer (1992) indicates that such social phenomena are concept-dependent (Sayer, 1992). Unlike natural phenomena they are not impervious to the meanings we ascribe to them. It is worth noting that the data collected and analyzed relied heavily on the input of the stakeholders and research subjects, and subsequently the researcher’s interpretation of content. To assist in making sense of the data collected a selection of computer software was utilized for collecting and analysing data for the project, inclusive of Leximancer (i.e. document analysis) and NVivo (i.e. interview analysis). The data analysis tools were applied in an attempt to provide the most thorough analysis of the data harvested and to strengthen the multi-case exploratory case study analysis offered lending comparative strength to the research findings.

The overarching qualitative data analysis method identified by the author as the most appropriate for this research was that of content analysis. There have been over forty types of qualitative data analysis identified and there is no singular type of qualitative data analysis used predominantly in research, but rather a variety of approaches, related to the different perspectives and purposes employed by researchers (Dey, 2003; Tesch, 1990). Content analysis is the systematic description of behaviour asking who, what, where, and when, and how questions within formulated systematic rules limit the effects of researcher bias (Miles & Huberman, 1994). It is the preferred technique for analysing semi-structured interviews of which this research included. Content analysis progresses quickly and case studies are one example of the product of content analysis. In this research interviews and a survey have been utilized to augment content analysis, assist in the development and subsequent interpretation of data, and in the production of key themes through the application of thematic analysis. It should, however, be noted that there are disadvantages associated with this type of analysis, for instance, the possibility of producing unconvincing results that seem marred by analyst bias. Content and subsequent thematic analysis is a good beginning but often is not sufficient in and of itself. To counter the argument of ‘unconvincing and bias results’ associated with content
and thematic analysis, and to ensure rigor, is demonstrated throughout the data analysis process, the researcher has applied a hybrid approach of inductive and deductive coding and thematic development (Fereday & Muir-Cochrane, 2006). This approach is supportive of the application of interpretive study, on which this research is grounded. Ultimately, it is ‘unlikely that a researcher could genuinely separate the two processes of induction and deduction’ entirely (Perry, 1998, p. 788). The priori and posteriori knowledge developed throughout the research process is most often undertaken simultaneously as the process of induction and deduction are linked approaches (Miles & Huberman, 1994). It is the subjective meaning of experience that has been central to the interpretation of results in this study, and the process of analysis that is outlined in this section attempts to demonstrate transparency of the methods applied by the researcher to formulating key themes from the data collected (Fereday & Muir-Cochrane, 2006).

The hybrid approach applied in this research began with the application of inductive reasoning early in the process of organizational and program case content analysis. Inductive reasoning involved the generalising and extrapolating of themes from initial information, for example, case studies, and capitalizing on this information to inform conclusions. Induction is an emergent approach not characterized by certainty but by drawing conclusions based upon pattern recognition within data (Sun, 2008). The coding process employed in the early recognition of thematic data during phase one of the data collection process involved the analysis of key organizational and program documents (refer Appendices 6 and 11), deemed by the researcher to be of significant relevance based upon previously reviewed literature pertaining to the line of study (e.g. EfS, globalisation, decentralisation, scalability etc.). Data was captured and then coded in Nvivo in the process of developing the literature review. Early thematic analysis was implemented prior to the process of interpretation and represents a data-driven, inductive approach, to the early coding of data (Boyatzis, 1998). The interview questions developed and used to structure key informant interviews were themselves products of the application of inductive reasoning, and are reflective of the researcher’s prior knowledge. In practice, it is recognized as quite difficult to ignore the theory already established in one’s mind prior to commencing data collection and analysis (Glaser & Strauss, 2009). Consequently, interview questions no doubt incorporated priori knowledge and were formulated based upon the emergent themes identified during document analysis, further refined during the pilot interview stage, and finally applied in phase two of the data collection process.
In addition to inductive reasoning, deduction was applied in the later phases of data analysis. In contrast to induction, deductive reasoning leads researchers from the general to the particular attempting to reduce down the data under consideration until only a conclusion is left (Evans & New, 2013). In this study, the coding and analysis of data in phase two of the data analysis process (i.e. interview transcript analysis) is characterized by the addition of new knowledge to that which has already been produced through the process of induction during document analysis. For example, the responses to interview questions provided the opportunity to develop, through further thematic analysis and development of key themes, survey questions that would be provided to an expanded research sample. The responses to interview questions were coded in Leximancer to produce a thematic tree and concept map (refer Appendix five). The key themes were then deduced from the data identified above through a six step process of codification relying upon a priori template developed using the model presented by Crabtree and Miller (Crabtree & Miller, 1992). The primary objective of the data analysis was to represent the experiences and feedback of key informants as it relates to organizational and program delivery and the facilitation of EfS. Table 23 identifies the stages of data coding applied as per the above-mentioned template.

**Table 23. Stages of data coding**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Rationale</th>
</tr>
</thead>
</table>
| Stage 1: Developing the code manual | A code manual was developed a priori and was based upon the research questions, the theoretical framework, and document analysis. Eight broad code categories formed the code manual:  
  - Scalability  
  - Accountability  
  - Networks  
  - Governance/Roles  
  - Functions  
  - Democracy  
  - Relevance  
  - Complexity  
  Codes were refined throughout the application of the research process. Codes were identified by their label, a definition of what the code concerns, and description of how to know when the theme occurs in both a qualitative and quantitative  
  The definitions and descriptions for the codes are identified in Table 24 |
<table>
<thead>
<tr>
<th>Stage</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 2: Testing the reliability of codes</td>
<td>Concurrently during document analysis and the pilot interviews the applicability of the codes was tested through the application of the theory-driven codes identified in Stage one to the data collection methods (i.e. case study documents and literature). Literature reviewed was coded in Nvivo and utilized in the development of the interview questions. Interview questions were subsequently piloted in three initial interviews and feedback from informants was sought on applicability of the interview questions to the research questions.</td>
</tr>
<tr>
<td>Stage 3: Summarising data and identifying initial themes</td>
<td>The raw data provided through the interview phase (i.e. program and project interviews) was analyzed using Nvivo for thematic sorting and Leximancer for concept mapping. Both processes utilized the same data sets and produced complimentary thematic statements that are utilized in the presentation of results. In both cases the thematic statements generated were the result of coding data according to the previously developed code manual. In the process of coding interview data, the researcher utilized emerging themes to develop survey questions that were provided to a larger sample of prospective informants. Data from survey responses was, with the exclusion of two questions, program specific and was utilized directly, as opposed to being re-coded, in the research analysis to substantiate findings.</td>
</tr>
<tr>
<td>Stage 4: Applying template</td>
<td>Utilising the code manual, the researcher applied the codes to the program and project documents and interview transcripts utilizing Nvivo as a data analysis tool. Segments of data were matched to the codes, identified as nodes in Nvivo, and data retrieval processes commenced. In some instances coding clustered themes within the eight code categories developed in Stage one. Analysis of the documents and data obtained during the interview phase was guided by the code categories, including the assignment of new data sets that highlighted a new sub-theme within the coding category.</td>
</tr>
</tbody>
</table>
Table 23. Continued.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 5: Connecting the codes and identifying themes</td>
<td>The data contained within the code categories was analyzed to extract themes across the three sets of data (i.e. document analysis, interviews, and survey). Similarities and differences within the data sets emerged and are highlighted in the results Chapters.</td>
</tr>
<tr>
<td>Stage 6: Corroborating and legitimising coded themes</td>
<td>In Stage six the previous steps were re-evaluated and scrutinised to ensure that the themes were representative of the data that had been analyzed and the coding that had subsequently occurred. When the researcher was satisfied that the themes were representative of the data obtained a process of interpretation commenced in which the results were analyzed through the application of the theoretical framework for meaning and connection to the research questions.</td>
</tr>
</tbody>
</table>

(Fereday & Muir-Cochrane, 2006)

The code manual was developed a priori and was based upon the research questions, theoretical framework, and literature review. As indicated by Boyatzis (1998), strong coding involves a data-driven and inductive approach that captures the fullness of the event or item being analyzed. The development of a code manual for this research was ultimately critical as it aligns to an inductive approach to data analysis and serves to organize and manage similar or related data segments in such a manner as to assist interpretation (Crabtree & Miller, 1992). The code manual used supports this process through a clearly delineated means of identifying the themes (i.e. codes) in which data is to be grouped. This approach improved the methodological rigor through demonstration of a trail of evidence maintained throughout the research process (Koch, 1994). Table 24 provides an overview of the code manual applied in this research identifying codes by their definition and description. The code manual engaged the data analysis tool Nvivo to physically code data from key informant interviews.

---

(Continued on next page...)

---

96
### Table 24. Code manual

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
<th>Rationale and Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scalability</td>
<td>Scalability, in the context of EfS, is changing the scope of education and learning methods, processes, and management according to the program size and reach (Duggan et al., 2013).</td>
<td>Scalability, as an organizational concept, realizes an enhanced impact if it can serve as an example for other programs, organizations, and communities across the globe. Scalability in and of itself can be evidence that an idea is sustainable (Catacutan, 2005), as a sustainable idea should be able to be replicated and repeated with continuing success. Scalability involves the proliferation of something that is considered effective such as programs, practices, or ideas. The objective of which is so more people can experience its benefits. A challenge lies in the development of its effectiveness and how monitoring and evaluation is applied (Weiss, 1998).</td>
</tr>
<tr>
<td>Accountability</td>
<td>The calling to account by an external body or person outside of the person or body being held accountable (Mulgan, 2000)</td>
<td>Accountability involves social interaction and exchange, and implies that one authority has rights to assert over another a requirement to be accountable and to seek rectification where applicable (Mulgan, 2000).</td>
</tr>
<tr>
<td>Networks</td>
<td>Social networks can be described as formations of social relationships that influence the behaviour patterns of their members, where these members are individual people, groups, organizations or even whole societies’ (Schafers, 2001).</td>
<td>Networks involve a common intention, are person-oriented, encourage voluntary participation, and are premised on a symbiotic, win/win principle of exchange (Schrittesser &amp; Rauch, 2003). Network forms of organization foster learning, represent a mechanism for the attainment of status or legitimacy, provide a variety of economic benefits, facilitate the management of resource dependencies, and provide considerable autonomy (Podolny &amp; Page, 1998).</td>
</tr>
<tr>
<td>Code</td>
<td>Definition</td>
<td>Rationale and Relevance</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Function</strong></td>
<td>The function of an organization, or specific project, is characterized by the internal and external factors and components comprising the organization/projects environment (Duncan, 1972)</td>
<td>Organizational behaviour shapes the function of an organization, and the existence of modern organizational bureaucracies is due to their ability to reduce costs, enhance efficiency, and provide reliable structures of collective action (Seibel, 1990).</td>
</tr>
</tbody>
</table>
| **Governance/ Roles** | Governance is the execution, and the performance of agents, in carrying out the goals of an organization (Duncan, 2013).                                                                                       | Governance is considered a key theoretical framework supporting and validating the explanations for how societal sectors work together (Kythreotis, Oaks, & Sage, 2012). The OECD (1999) describe the importance governance in mainstreaming EfS as including four key dimensions: 1) The school level, 2) the pupil learning level, 3) the research level, and 4) the policy level. For the purposes of this research and in drawing a deeper comparison to the delivery of EfS at scale four distinct roles enacted by decentralised organizations have been aligned to the above OECD definitions and utilized to code data. These roles are:  
  - teacher educator role,  
  - practical delivery role,  
  - theoretical development role, and  
  - administrative role. |
<p>| <strong>Democracy</strong> | Democracy is a system that ensures the opportunity for desirable results through a process of making collective and binding decisions (Dahl, 1989). Democracy and good governance are considered to be mutually supportive (Fukuyama, 2013). | Democracy is tied in many ways to scale as the progression of democratic governance from the city-state to the nation-state and now to a globalised world has a significant affect upon the advantages and virtues democracy is able to deliver (Dahl, 1989; Dahl 1999). |</p>
<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
<th>Rationale and Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevance</td>
<td>Relevance always implies a relationship, frequently through communication and exchange, and insinuating an interactive and dynamic orientation towards the establishment of context (Saracevic, 1996).</td>
<td>Relevance is a concept that is intuitively understood, however, very difficult to define (Cosijin &amp; Ingwersen, 2000). In the context of EfS facilitation relevance relates to the social concerns and objectives of the stakeholders associated with the organization and/or project. In some cases relevance may determine the, for example, direction, funding and delivery of EfS projects.</td>
</tr>
<tr>
<td>Complexity</td>
<td>Complexity in education involves the interplay between organizational structure and people (Schrittesser &amp; Rauch, 2003).</td>
<td>The educational structure necessary to scale EfS requires development and constant redevelopment. This complex, system supports a sense of achievement, common learning and a network identity throughout the development process (Schrittesser &amp; Rauch, 2003).</td>
</tr>
</tbody>
</table>

At the point at which the code manual was applied to the raw data harvested through the key informant interviews, and the concept map and thematic tree generated through Leximancer analysis, closely related concepts and supporting evidence began to emerge. The emergence of these concepts was the product of both content analysis and the subsequent application of thematic analysis. Content analysis, as indicated previously, is the core methodological approach applied in this research. It relies upon the identification and subsequent frequency of words or phrases in the interview transcripts and key documents analyzed in order to identify specific keywords or the repetition of ideas (Namey, Guest, Thairu, & Johnson, 2008). However, the research must also identify the thematic implications of the content analyzed and, therefore, applies thematic analysis to ‘move beyond counting explicit words or phrases and to focus on identifying and describing both implicit and explicit ideas’ (Namey et al., 2008, p. 138). For example, if the interview transcripts unveiled a close relationship between the uses of the words ‘people’ and ‘network’ the researcher could infer that these sub-themes were related. If, upon further review, the relationship of these words was linked to the word ‘organization’, the researcher could expand upon this finding to identify a thematic relationship between
‘networked organizations and the people that they are composed of’ or a multitude of other permutations of this combination of words. Applying Leximancer assisted to establish the connections within the text and demonstrated where word combinations describe a concept or, if quite different words or ideas are used, to describe a common theme. Both content and thematic analysis were applied in a manner that was theory-driven (Weber, 1990) as the research was guided by specific ideas and themes, related to the theoretical framework and research questions, in the data that the researcher wanted to assess (Namey et al., 2008).

A process of data reduction was adopted to ensure that the data was separated during exploratory analysis so that it could be appropriately analyzed for applicability to the theoretical framework. Miles and Huberman (1994:11) indicate that ‘data reduction is not something separate from analysis…which data chunks to code and which to pull out, which evolving story to tell – are all analytical choices.’ The researcher made ‘analytical choices’ during the process of sorting and coding data generated from content analysis (i.e. Leximancer and NVivo) and against the emerging themes identified in the Code Manual. Table 25 identifies the three criteria the researcher used to make these analytical choices and to match patterns found amongst these ‘data chunks’ piecing sub-themes and their respective thematic statements together. An example of the application of these criteria is found in Appendix six.

Table 25. Data reduction through sub-theme categorization

<table>
<thead>
<tr>
<th>Categorisation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepted Pattern (Yellow)</td>
<td>Pattern is deemed to be accepted as a likely correlation which would surface across interview transcripts (e.g. the words ‘environmental’ and ‘education’ grouped closely in the data).</td>
</tr>
</tbody>
</table>
| Emergent Pattern (Orange) | Pattern is deemed to be emergent in that it:  
  - aligns to a theme/code category;  
  - is less likely to have been correlated to another word/phrase; and,  
  - the correlation occurs a number of times across data sources (e.g. interviews). |
Table 25. Continued

<table>
<thead>
<tr>
<th>Categorisation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern Emerged (Red)</td>
<td>Pattern is deemed to have emerged from data analysis in that it:</td>
</tr>
<tr>
<td></td>
<td>• aligns to a theme/code category;</td>
</tr>
<tr>
<td></td>
<td>• is less likely than the previous category (as identified by the number of times the word is identified) to have been correlated to another word/phrase; and,</td>
</tr>
<tr>
<td></td>
<td>• the correlation occurs a number of times across data sources (e.g. interviews).</td>
</tr>
</tbody>
</table>

In order to identify the concepts from the thematic map produced by Leximancer, the researcher applied a deductive process of sub-theme categorisation involving the identification of emerging patterns based upon alignment and combination of words and phrases. Colouring (i.e. yellow, orange and red) was used to indicate the category of analytical choice based upon the number of times the words/phrases were found to align with one another. An example of this process is provided in Appendix six (i.e. Pattern Matching). This approach focuses upon uncovering the latent themes and patterns presented by the data. This method aligns with the researcher’s methodological approach (i.e. interpretivism) and lends itself well to both thematic analysis and sub-theme categorization as further discussed in the section to follow and in the Results section (i.e. Section 5.3.3).

4.7.1 Sub-theme Categorization

The researcher utilized the word identification map and process of sub-theme categorization developed through application of Leximancer to identify relationships between key words and phrases in an attempt to construct a list of key themes with which to guide the development of survey questions. Words and phrases were coded in congruence with the coding process identified in section 4.7 and under the direction of the code manual. As indicated previously, an interpretive methodology has been applied. Interpretation of the meanings of perceptions, experiences and actions identified by the Interviewees, and the recognition that knowledge is both subjective and socially constructed has guided the development of the survey questions and the subsequent analysis of data. The application of a hybrid approach, inclusive of inductive and deductive reasoning, to the responses to interview questions provided the opportunity to
refine further the thematic analysis and development of key themes established during the document analysis phase.

The analysis of interview data yielded thematic statements developed from the connected concepts identified during the process of coding in Nvivo and Leximancer. The researcher grouped these concepts under seven of the eight codes (Table 26) found within the code manual. These statements characterized the interviewee’s responses to interview questions and, in some cases, thematic statements are characteristic of multiple codes. The seven codes include: 1) accountability, 2) networks, 3) roles, 4) governance, 5) democracy, 6) relevance, and 7) complexity. The eighth code, scalability, in the code manual has not been applied directly to the development of thematic statements as the researcher has identified it as being closely related to the thematic statements concurrently with other codes. Scalability is the code most closely linked to the theoretical framework applied throughout and is, therefore, believed to be intrinsically related to all of the codes and the thematic statements which emerged from the analysis of interviews.

Table 26. Sub-Themes related to Codes

<table>
<thead>
<tr>
<th>Codes</th>
<th>Thematic Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountability to stakeholders</td>
<td>• Sense that the idea or questions being researched are specific and real.</td>
</tr>
<tr>
<td></td>
<td>• The inherent ability of people and the organization.</td>
</tr>
<tr>
<td></td>
<td>• Organization of international and research network.</td>
</tr>
<tr>
<td></td>
<td>• Time taken in doing research.</td>
</tr>
<tr>
<td></td>
<td>• A sense of a real level of national support (from Government).</td>
</tr>
<tr>
<td></td>
<td>• A sustainable organization in the traditional sense of the word.</td>
</tr>
<tr>
<td></td>
<td>• Quality of projects/research can influence level of support.</td>
</tr>
<tr>
<td>Network development</td>
<td>• Importance of different people to projects over time.</td>
</tr>
<tr>
<td></td>
<td>• Country networks and organization.</td>
</tr>
<tr>
<td></td>
<td>• Need/importance for people to be involved in the research.</td>
</tr>
<tr>
<td></td>
<td>• People supporting the research/projects.</td>
</tr>
<tr>
<td></td>
<td>• A sense there is a real level of support.</td>
</tr>
<tr>
<td></td>
<td>• The role and involvement of countries in different projects.</td>
</tr>
<tr>
<td></td>
<td>• Projects able to develop through support.</td>
</tr>
<tr>
<td></td>
<td>• Importance of different people, networks and organizations working on projects.</td>
</tr>
<tr>
<td>Codes</td>
<td>Thematic Statement</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Role in EfS facilitation</strong></td>
<td>• Ability to establish an international organization.</td>
</tr>
<tr>
<td></td>
<td>• Doing research in schools.</td>
</tr>
<tr>
<td></td>
<td>• Doing research during the UN-DESD.</td>
</tr>
<tr>
<td></td>
<td>• Time taken in doing research.</td>
</tr>
<tr>
<td></td>
<td>• Level of money from government.</td>
</tr>
<tr>
<td></td>
<td>• Specific examples of research used in schools.</td>
</tr>
<tr>
<td></td>
<td>• A sustainability organization.</td>
</tr>
<tr>
<td></td>
<td>• A focus on specific questions, different ideas during the UN-DESD.</td>
</tr>
<tr>
<td></td>
<td>• The level of support and work put in by government/countries to develop networks.</td>
</tr>
<tr>
<td><strong>Governance structure</strong></td>
<td>• Government money provided to research.</td>
</tr>
<tr>
<td></td>
<td>• Specific roles of the organization.</td>
</tr>
<tr>
<td></td>
<td>• The ability of people and the organization.</td>
</tr>
<tr>
<td></td>
<td>• The people engaged with government.</td>
</tr>
<tr>
<td></td>
<td>• Importance of different people, networks and organizations working on projects.</td>
</tr>
<tr>
<td><strong>Network democracy</strong></td>
<td>• Need/importance for people to be involved in the research.</td>
</tr>
<tr>
<td></td>
<td>• Organization of international research network.</td>
</tr>
<tr>
<td></td>
<td>• Specific roles of the organization.</td>
</tr>
<tr>
<td></td>
<td>• A sense there is a real level of support.</td>
</tr>
<tr>
<td></td>
<td>• Importance of time, ideas, work and projects.</td>
</tr>
<tr>
<td><strong>Relevance to stakeholders</strong></td>
<td>• Unique or different nature of questions on a national (macro) scale.</td>
</tr>
<tr>
<td></td>
<td>• Need for research to focus on policy.</td>
</tr>
<tr>
<td></td>
<td>• Importance of project work at that time.</td>
</tr>
<tr>
<td></td>
<td>• Important that research projects involves international (country/national) and organizational reach.</td>
</tr>
<tr>
<td></td>
<td>• Doing research during the UN-DESD.</td>
</tr>
<tr>
<td></td>
<td>• Level of money from government.</td>
</tr>
<tr>
<td></td>
<td>• Specific research examples used in schools.</td>
</tr>
<tr>
<td></td>
<td>• Real environmental education and research with real questions.</td>
</tr>
<tr>
<td></td>
<td>• A sense of real research.</td>
</tr>
<tr>
<td></td>
<td>• A sense of a real level of national support (from Government).</td>
</tr>
<tr>
<td></td>
<td>• A focus on doing things each year during the UN-DESD.</td>
</tr>
</tbody>
</table>
Table 26. Continued.

<table>
<thead>
<tr>
<th>Codes</th>
<th>Thematic Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• The level of support and work put in by government/countries to developing networks.</td>
</tr>
<tr>
<td></td>
<td>• A sense of focus on different ideas is related to the level of support.</td>
</tr>
<tr>
<td></td>
<td>• Quality of projects/research can influence level of support.</td>
</tr>
<tr>
<td></td>
<td>• Complexity of a learning network</td>
</tr>
<tr>
<td></td>
<td>• Quality of research projects and ideas.</td>
</tr>
<tr>
<td></td>
<td>• Country networks and organization.</td>
</tr>
<tr>
<td></td>
<td>• Ability (able) to get international organization in place.</td>
</tr>
<tr>
<td></td>
<td>• A sustainable organization in the traditional sense.</td>
</tr>
<tr>
<td></td>
<td>• A sense of a focus on different ideas is related to the level of support.</td>
</tr>
<tr>
<td></td>
<td>• Quality of projects carried out in different countries.</td>
</tr>
</tbody>
</table>

Further analysis was organized for each of the above seven codes and related thematic statements through the process of triangulation (refer Section 4.5.3, Figure 4). The six themes identified during the document analysis phase were then further examined using the thematic statements generated through interview analysis and aid in the comparative analysis of data as described in subsequent sections.

4.7.2 Comparative Analysis

When considering common routes to general knowledge, specifically regarding social phenomena, accumulating knowledge through the comparative analysis of specific cases is considered an appropriate approach (Ragin, 2003). It is argued that the case study method may be related closely to that of comparative analysis and, therefore, is complementary as a method of analysis (Lijphart, 1971). A multi-case approach was thought to be appropriate and was applied to the analysis of a leading case study and four program case studies. The first step in this approach was determining that the case studies were indeed going to be the unit of analysis central to this comparison (Baxter & Jack, 2008). The researcher identified two layers of analysis in which to bind the study, namely the investigation of the organizational and program levels of a DGNs (Miles & Huberman, 1994). Firstly, an organizational case considering the first research question (i.e. How does a Decentralized Global Network facilitate EfS at a macro (i.e. organizational) level?) was analyzed; and, secondly the comparative analysis of four program case studies to address the second research question (i.e. How does a
Decentralized Global Network facilitate EfS at a micro (i.e. program) level?). These case studies were oriented towards the acquisition of in-depth knowledge including an understanding for how the different elements or criteria of the cases fit together (Ragin, 2003).

The aim of the comparative analysis of the program cases was to provide an indication of the similarities and differences between key criteria highlighting both points of similarity and contrast. Specifically, the program cases may vary quite widely in context, goals and methods, however, they can be compared based upon the criteria that describe the program approaches each have taken (Mog, 2004). This ‘process-oriented’ comparative analysis technique distinguishes itself from other techniques as opposed to assessing specific indicators it focuses on the investigation of the process itself (OECD, 2000). The application of this framework is an appropriate approach to the examination of the facilitation of EfS, as discussed previously in the literature review EfS is considered an independent process of learning in and of itself.

The next step in applying this method was to identify the case study criteria that would be used to frame the analysis. It was envisioned that the context, objectives, methods and outcomes of any two EfS programs would vary widely; therefore, process-oriented criteria were considered an appropriate means to frame the interpretation of data (Mog, 2004). The criteria act as frames of reference for the cases. As indicated previously, the research approach applied both exploratory and descriptive case study strategies at multiple levels (i.e. organizational and program). The commonality between the EfS programs analyzed was identified through the development of the code manual previously referred to. These codes represented a common approach to EfS facilitation that each program separately addressed and are a frame of reference used to analyze the organizational and program cases. The researcher settled upon four process-oriented criteria that would allow for analysis and comparison between cases. Table 27 identifies these criteria and the key process and outcome questions applied to each criteria cited. These questions were posed of each case and the responses used to examine differences and similarities amongst cases.
### Table 27. Comparative analysis applying process-oriented criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Process</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1: Identify Organizational/Program Objectives and Deliverables</td>
<td>What are the program objectives and what will be delivered when these goals are achieved?</td>
<td>What are the outcomes of these objective being (or not being) realized?</td>
</tr>
<tr>
<td>Step 2: Identify Facilitation Methods</td>
<td>What methods have been applied to the facilitation of EfS?</td>
<td>What has been achieved through these methods application?</td>
</tr>
<tr>
<td>Step 3: Map Reach (Geographical and/or volume)</td>
<td>What are the scales in which EfS has been facilitated?</td>
<td>How many participants have been reached? How many countries has the program been delivered in?</td>
</tr>
<tr>
<td>Step 4: Identify Products/Outcomes</td>
<td>What products and/or outcomes have been developed and delivered?</td>
<td>How do the products/outcomes compare or contrast to other programs?</td>
</tr>
</tbody>
</table>

(Process-oriented approach adapted from Mog, 2004)

The aim of the comparative analysis was to provide an indication of the similarities and differences between key elements of the case studies, utilizing a process-oriented approach inclusive of common criteria to identify these correlations. Chapter 5, Section 5.3.2 reports on this process at the program level including further detail regarding the application of the comparative analysis approach.

#### 4.7.3 Internal and External Validity

It is widely accepted that research should be transparent, ethical and involve rigor. As a number of qualitative researchers acknowledge (Denzin, 1994; Mansvelt & Berg, 2005; Marcus & Fischer, 1986), the increase in the influence of a poststructuralist rationale has made research credibility such as reliability, validity and generalizability appear less important. The author acknowledges this trend and the impact it has upon the confirmation of correctness of study design (i.e. internal validity) and the extent to which results can be generalized (i.e. external validity). The impact of a case study approach upon the ability to address these constructs sufficiently is examined in this section.
Firstly, generalisability is the extent to which research findings can be applied to other settings than those in which they were originally described. It is a concern of the author that, as argued by Stake (1995), the primary aim of case study is not to provide generalisations as a result of the importance of context of each case, ‘learnings that are gained from one case may not easily be applied to other contexts’. The business of case study research is more about particularization rather than generalization’ (Stake, 1995) and it would be unfair to apply generalisability as a principle of validity in case study research. Lincoln and Guba (1985; 110) argue that in case study ‘the only generalization is that there is no generalization’, and they discuss instead the degree of transferability of findings across contexts.

Secondly, because of the prominence of subjective interpretation within the case study approach, both on behalf of the researcher’s preconceived notions and interpretations of the data, as well as the research participants’ multiple interpretations of their context, there are issues of validity and reliability inherent within case study research. Scapens (2004) writes that ‘reliability implies an independent, impersonal investigator, and validity implies an objective reality’ continuing on to argue that these concepts are both ‘meaningless in much case study research’ (Scapens, 2004, p. 268). In most instances, therefore, case research cannot be a neutral and objective process and like much qualitative research, suffers from a ‘crisis of representation’ (Mansvelt & Berg, 2005, p. 259). The case study researcher must instead adopt a reflexive (Mansvelt & Berg, 2005), procedural reliability (Scapens, 2004) approach that highlights the ways in which the subjectivity of the researcher has shaped the research process and that prioritises the transparency of the research design (Mansvelt & Berg, 2005; Scapens, 2004; Stake, 1995; Yin, 1995). As Bradshaw and Stratford (2005) argue, ‘It is no frivolous thing to share, interpret and represent others’ experiences. We need to take seriously the ‘privilege and responsibility of interpretation’ (Stake 1995, p. 12).

A third practical issue in case study research is that it is time consuming and leads to data overload, which can make managing case study research complex and unwieldy (Scapens, 2004; Yin, 1995). Multiple data gathering techniques from a variety of sources were employed and the researcher created strict reporting and data management/analysis systems (e.g. code manual). Representing such complexity, often through linear forms such as a research report or narrative, requires excellent language and organizational skills and various techniques such as member checking and editorial review of the case studies.
and papers respectively have been applied to achieve a high standard of research and presentation.

4.8 Ethical Considerations

Initial Ethics Approval for this project was granted by the University of the Sunshine Coast Research Ethics Committee in September 2008 (HREC S/08/180). Due to an amendment to the research questions a subsequent ethics approval was sought and granted in February 2012 (HREC S/11/364) prior to the commencement of data collection. All ethics approval conditions have been adhered to as per approval requirements.

The comparative analysis and desktop audit of programs required the detailed review of selected programs and related data, participants’ information, and program outcomes. Although the case studies (i.e. ENSI’s) material is made public as standard practice it was important that any potential for information collected to be used in a context outside that for which participants initially provided the material be made explicit to all organizational and/or program participants. The case study component of the enquiry focused on complex entities operating within certain ethical boundaries. Therefore, first and foremost, there was a need for consent from Interviewees. Interviewees were fully and honestly informed of the research. Written agreements were required to ascertain consent and for future reference prior to participant observation and interviews being commenced.

To enable assessment of the informant’s values and perceptions about EfS informants were asked to respond to a series of questions using paper and/or digital surveys. Data collected was not made traceable to any individual and the data from the research was not shared with people uninvolved in the research project. All data generated through the interviews and survey was de-identified to ensure the anonymity of responses and is referred to only by data type and number (e.g. Interviewee #1) throughout the remainder of this article. This protects individuals from any physical or emotional harm and the organization from any responses that could place undue stress or hardship upon any of the projects and/or organizational stakeholders. It was considered important to establish data sets that will not negatively impact current and future projects. The data to be published did not compromise, for example, the informant’s ability to gain funding for future projects. If necessary, contracts were to be established to clarify ownership and nature of data to be put in the public arena through publications. In addition, a Data Management and Storage Plan has been enacted whereby data (i.e. interview transcripts,
completed surveys, Nvivo data analysis and a research journal) is stored securely. Further
information regarding this Plan can be found in Section 4.8.2.

It is the intention of the author to disseminate the final results of the research as
conference papers synthesising the main findings of the study, refereed international
journal articles, and form part of the applicant’s PhD thesis. All participants will be
provided with a Project Outcomes Brief, and therefore, will have access to copies of the
thesis. For example, the DGNs (i.e. ENSI), which provided the organizational and
program case studies developed and analyzed in this research have indicated that they
would like copies of the thesis to distribute to their Country Coordinators, Project
Managers, and Executive Council Members and will be provided with copies for this
purpose.

4.8.1 Informed Consent

Informed consent for the use of specific project case studies analyzed was provided by
the Secretariat and project leaders of ENSI. The Foundation for Environmental Education
case study was compiled from freely available project overviews and a key informant
interview. Key informants were provided with Research Project Information Packages
inclusive of formal letters of invitation to contribute to the research, information sheets,
and informed consent declarations (refer Appendix 15). No data was collected until
formal consent was provided by key informants.

Seventeen key informant interviews were conducted via electronic communication
(e.g. online meetings, teleconference) with all key informants (i.e. project managers,
ENSI Council Members, and country representatives inclusive of 3 pilot interviews). A
sample of Project Managers, ENSI Council Members, Country Representatives, and a
number of ENSI Mentors were also provided with a survey questionnaire with the purpose
of providing further data to support research findings. The ENSI Secretariat offered to
assist in the identification of participants for this study and to provide access to Country
Coordinators, Project Managers, Council members and ENSI Mentors. Participants were
provided with a letter (soft and/or hard copy) on University of the Sunshine Coast (USC)
and/or ENSI letterhead inviting them to participate in specific aspects (i.e. interview
and/or survey) of the research study. ENSI contacted the prospective interview
participants on behalf of the researcher to request divulging of contact details for the
purpose of the research to a third party (i.e. the researcher). Survey participants were
identified through the ENSI and Federation of Environmental Education (Wondolleck & Yaffee) member and network lists. All data relating to the interview, survey and all other research data are kept as per the confidentiality and data security requirement outlined in the following section.

**4.8.2 Confidentiality and Data Security**

Interviews were conducted via online conferencing facilities (i.e. Skype) and an online survey questionnaire (i.e. Survey Monkey). Interviews were voice recorded and transcribed. These transcripts were made available to participants upon request. All voice recordings were deleted upon the completion of transcribing. Digital storage of all data, including interview transcripts and online surveys, is kept on a secure server system, password protected, encrypted and under lock and key in a home office. Hard copies are kept under lock and key in an office filing cabinet. In addition, a copy of the digital data is kept at the University of the Sunshine Coast under the care of the Sustainability Research Centre.

The initial risks of this study addressed in the research design are in regards to the operation of both large scale and decentralised programs and their compliance with governance and operational legal requirements. In interviewing program leaders/managers there is the potential that interview questions, and subsequent responses, may elicit information that indicates that program governance and implementation requirements have not been complied with. However, the likelihood of this occurring and/or negative impact is negligible and represents only a marginal risk to the participants and/or organization. Should these risks be realised any information will be kept confidential and the severity of the legal issues will be assessed by the research team. The questions regarding organizational and program governance are necessary to identify gaps in the theoretical frame of the project as they relate to the facilitation of key aspects of the case studies and wider organization.

**4.9 Chapter Four Conclusion and Study Limitations**

The interpretive research approach was chosen as the philosophical basis for this research. As interpretive research involves a narrative in which multiple voices, perspectives or discourses are present and engage and interact with each other, it will be important to ensure that the data gathered is rigorously reviewed and triangulated with questionnaire and case study analysis to provide a picture for how the research questions
are examined. Chapter four has provided a description of the methodology, methods, and data analysis interpretation through which the research will proceed. The literature presented in Chapter two and three was instrumental in presenting a detailed overview enabling the progression of theoretical development that has occurred within this Chapter. The initial review of environmental ethics and its impact upon the conceptual definition of sustainability and EfS has developed the foundation, and presents the core philosophical positions and discourse that have acted as a driver for the shift from environmental education to the present day focus upon EfS. Upon examining the UN-DESD as a global driver and the evolving concept of sustainability learning the author has presented a case for how this social phenomenon has been impacted by the increasingly globalised world and the proliferation of decentralized approaches to organizational and program delivery. The author has identified the impact of decentralization and the current lack of information on scaling up, out and in of EfS programs as a significant gap in the research. In addition, to surmount the challenges facing DGNs it is clear that they must ensure that monitoring and evaluation frameworks is implemented as a first priority and that organizations and their projects are continuously assessed against indicators that provide a snapshot of the outcomes being achieved and those that are not. Assembled from the above analysis is the conceptual framework (i.e. global, multi-scale), which has been introduced to assist in articulating the understanding of how DGNs facilitate EfS at multiple scales. A multi-perspective research approach has been outlined inclusive of document analysis and three core data-gathering methods (i.e. observation, interview and survey). Content analysis has framed the interpretation of data, which has been subject to codification and triangulation in the process of preparing it as an input to case study development. Comparative analysis of the program cases has been designed as a means to provide an indication of the similarities and differences amongst them. This Chapter concluded with an overview of the implications of internal and external validity, and the ethical considerations identified and accepted through ethics approval having been provided by the University of the Sunshine Coast’s Human Research Ethics Committee.

Despite every precaution being taken some limitations were identified in this study. As corroborated by Fereday and Muir-Cochrane (2006), the data was collected, coded and themes were identified by the author. Analysis of data was discussed with the research supervisors, and methodology reviewed by an independent reviewer during research.
project confirmation. The process, although consistent, in the end does not account for multiple perspectives to be applied to the coding and interpretation of data. However, this can be attributed to the characteristics of a doctoral study, and the fact that the researcher is theorizing a novel contribution to academia and using methods felt most appropriate to the task in which to perform data processing functions required of the research. This process does provide significant structure to qualitative analysis and involves a ‘balance of deductive coding and inductive coding…’ that ‘identifies clearly how themes were generated from the raw data to uncover meanings’ (Fereday & Muir-Cochrane, 2006).

In conclusion, this Chapter has provided a conceptual and practical frame for conducting the research. The subsequent Chapter presents the results, findings and discussion relating to the application of this research process.
Chapter 5: Results and Discussion
Chapter 5. Results and Discussion

5.1 Introduction

As the UN-DESD reached its conclusion in 2014 the findings identified in the following chapters present an opportunity for the research community and organizations/practitioners of EfS to examine in further detail the facilitation of EfS prior to and during the Decade. EfS and an awareness of sustainable development has received an increasing amount of attention in recent years (Ferreira, Ryan, Davis, Cavanagh, & Thomas, 2009; Wals, 2009), and, as argued by Bourn (2005), the UN-DESD provided educators with an opportunity not previously realised to implement EfS programs and projects at varying scales including local, national and global opportunities aligned to the objectives of the Decade and more wide-ranging Millennium Development Goals. The UN-DESD provided the most recent and extended context in which to examine the facilitation of EfS at scale, emphasizing for example, bringing stakeholders together, networking, exchanging ideas, and, reorienting education towards sustainability have been cornerstones of the Decade’s objectives (Firth & Smith, 2013). As proposed in this thesis, these objectives align neatly with emerging drivers readily associated with scaling EfS. In previous chapters it was articulated that one goal of this study was to develop a theoretical framework that examines the concept of scalability as it relates to the facilitation of effective EfS programs delivered by decentralised, global networks. To achieve this goal the research focused on three questions, these have been examined and are presented in subsequent sections of this Chapter. Table 28 provides an overview of this chapter’s structure and its presentation of the findings as they relate to each research question.

Table 28. Chapter Five Structure

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>5.2</td>
<td>Application of the Research Methods</td>
</tr>
<tr>
<td>5.3</td>
<td>General results and discussion</td>
</tr>
</tbody>
</table>
To recap, the research approach was designed to examine how a DGNs facilitates EfS, and how the application of scale is intrinsically linked to this facilitation. In examining each of these research questions the researcher has engaged in qualitative and quantitative analysis through the application of the research methodology and methods (i.e. participatory observation, document analysis, key informant interviews and a survey) identified in Chapter four. The findings put forward in subsequent sections have been employed to craft an in-depth understanding of the organizational and program nuances of a DGNs facilitation of EfS at varying scales.

5.2 Application of the Research Approach

The following three sub-sections of Chapter Five (i.e. Section 5.3.1, 5.3.2 and 5.3.3) are structured to present the results in the same chronological order as the research approach indicated the methods have been applied. As previously mentioned an interpretive research paradigm directed this research and an iterative process was followed, whereby, the data generated through the application of the three research methods have been analyzed in the order in which the methods have been applied and data has subsequently informed the application of the next method. For example, document analysis informed the development of interview questions, which in turn informed the development of the survey questions (refer Section 4.4, Research Methods and Process). Each results section presented in Chapter five has been structured to illustrate this process by presenting results from the document analysis, followed by the interviews, and concluding with survey data and analysis. Each of these sections in turn present the results ordered by key theme and in line with the application of the code manual. The results are summarised in tables and figures utilising text to compliment, not replicate, key information.
A final word on the rigor embedded into the findings and analysis sections is offered. As per the explanation in Section 4.5.1, there have been a number of techniques employed to ensure transparency, validity, reliability, comparativeness and reflexivity of data. The author also kept a research journal that documented each stage of the research process and data analysis and interpretation since commencement of the project in 2008; data analysis and triangulation amongst the data collection methods has been employed and documented in Nvivo and Leximancer; supervisory, journal review board and confirmation reviewer notes and determinations have been archived; and, member checking of case studies has been undertaken by the ENSI Secretariat. All supporting analysis and interpretation is available for examination by thesis reviewers. In addition, currently ‘under-review’ and published journal articles have comprise the bulk of the results Chapter content ensuring that the findings have previously undergone peer-reviewed academic scrutiny.

5.3 Results and Discussion

The remainder of the chapter focuses on communicating the findings gleaned from the data analysis and presents these results by addressing the three research questions. As indicated previously, the findings have been presented through the inclusion of three journal articles. Excluding the amendment of the articles to align with the structure (e.g. spacing, table format, etc.) of the thesis as a whole they have been placed in this thesis as per their published or under review submission formats. It is envisioned that the approach of preparing published articles as a component of this thesis has assisted in ensuring the findings have been rigorously examined prior to being presented. In addition, this process has assisted the author to reflect upon his own research through the practice of responding to third-party review comments and queries, and adjusting the article submissions to address these observations and critiques.

5.3.1 Organizational Approaches to the Facilitation of Education for Sustainability: An Interpretive Case Study

Decentralised networks face adversity and challenge in their delivery of programs. As will be identified in the ENSI case study many might have suspected that they (ENSI) would become a ‘historical oddity, a kind of educational archaeopteryx’ (OECD, 1994) that was established, developed but would end nowhere. This has not been the case and, quite to the contrary, the combination of political drive and individual agency exemplified
by the ENSI organization over the past 25 or more years has helped to characterize the unique structure of the organization, as far as being facilitators of EfS is concerned, and has entrenched in it a culture of resilience which has withstood the test of time.

The ENSI case is representative of a DGNs facilitating EfS and the results presented and conclusions drawn in the ensuing section demonstrate through how these networks go about facilitating EfS. The following section is inclusive of a published journal article that examined the dimensions inherent in scaling up, out and in EfS at an organizational level.

Author Contributions

Michael S. Duggan was the lead author to the publication titled *Organizational Approaches to the Facilitation of Education for Sustainability: An Interpretive Case Study* providing 90% of the content of this publication. Timothy F. Smith and Dana C. Thomsen provided 5% of the content each assisting in conceiving/designing the methods and contributing materials/tools to the process of analysis. Michael S. Duggan collected all of the data and conducted all of the analysis.

Michael Stewart Duggan       Timothy F. Smith       Dana C. Thomsen
Organizational Approaches to the Facilitation of Education for Sustainability: An Interpretive Case Study

Michael S. Duggan *, Timothy F. Smith and Dana C. Thomsen

Sustainability Research Centre, University of Sunshine Coast, Locked Bag 4, Maroochydore DC, Queensland 4558, Australia; E-Mails: TSmith5@usc.edu.au (T.F.S.); DThomsen@usc.edu.au (D.C.T.)

* Author to whom correspondence should be addressed; E-Mail: msd010@student.usc.edu.au;
Tel.: +61-434-140-069.

Academic Editor: Sara Holdsworth

Received: 2 March 2015 / Accepted: 20 May 2015 / Published: 2 June 2015

Abstract: The facilitation of Education for Sustainability (EfS) by Decentralized Global Networks (DGNs) is consistent with the dynamic and increasingly complex nature of sustainability issues, and is often motivated by inter-governmental policy objectives that link sustainability learning with sustainable development. The use of DGNs for EfS is now well established and supports the participation of a geographically dispersed and diverse body of participants that consist of teachers, teacher-educators, policy makers, and researchers. However, there is limited understanding of the complex systems operating within DGNs and how these systems generate the conditions necessary to facilitate EfS. In this article, the authors report on an interpretive case study of the Environment and School Initiatives (ENSI), a DGNs
operating for over 26 years with a membership that has spanned over 25 countries. Findings highlight six dimensions of the ENSI DGN important to the effective facilitation of EfS including: 1) developing a community of practice; 2) planning for phased organizational development; 3) structured decentralization using a strategy-node-program framework; 4) linking research to practice; 5) ensuring relevance through contextualized approaches; and 6) monitoring and evaluation of processes and outcomes. The findings identify organizational level approaches to EfS facilitation such as addressing the nexus created between policy, practice and research, and developing a structure focused on learning and the development of networks more broadly. In conclusion, the delivery of learning and teaching strategies through a geographically dispersed and diverse group of participants can address the inherent complexity of EfS facilitation across various spatial and cultural scales.

**Keywords:** education for sustainability; community of practice; decentralized global network; facilitation; Environment and School Initiatives (ENSI)

---

**5.3.1.1 Introduction**

Increasing recognition of the global and interconnected nature of sustainability issues has given rise to approaches to Education for Sustainability (EfS) that are similarly international in scope and delivery. These approaches use Decentralized Global Networks (DGNs) spanning multiple jurisdictions and geographic boundaries to facilitate EfS programs. The Environment and School Initiatives (ENSI) commenced in 1986 and is a noteworthy example of a DGNs that has connected researchers, teachers, teacher-educators, and policy-makers through the delivery of its EfS programs. The ENSI Organization has included members spanning over 25 countries and research addressing program outcomes has been presented at over 300 conferences and in over 150 EfS documents and published research papers [1–11].

The practice of delivering EfS through a DGNs is not isolated to the ENSI case. There are other examples of both more recent and past DGNs with significant histories of
facilitating EfS. The Foundation of Environmental Education (Wondolleck & Yaffee), is another important example of a DGNs that began facilitating environmental education in 1981 and now delivers EfS programs through 83 members representing 67 countries [12,13]. Together, ENSI and FEE are two of the longest continuously running DGNs that deliver EfS programs internationally [14–16]. Other noteworthy examples include the Center for Ecoliteracy [17] which commenced in 1995 and now delivers programs in over 30 countries; and, the Environmental Education Group which has been facilitating EfS for over 40 years including involvement in the founding of the Earth Day global EfS initiative [18].

The remainder of this article focuses on the interpretive case study of the ENSI DGNs. As a DGNs, ENSI contributes to activities at local (e.g., school-based EfS), national (e.g., EfS policy development) and global (e.g., international and multi-stakeholder partnerships) scales. While a networked approach promises to overcome difficulties in contextualizing sustainability knowledge across these extensive organizational, cultural and geographic scales and can support regions with limited resources, few studies have been undertaken to explore how a DGNs facilitates and supports EfS. As part of a larger study into the practices of DGNs concerned with EfS, this article explores ENSI as a significant case study to determine effective strategies characterizing the delivery of EfS at an organizational level and the complex issues arising from the participation of a geographically dispersed and diverse group of participants comprising a DGN.

5.3.1.2 Methods

An interpretive case study approach was used to generate detailed and contextualized data from ENSI at the organizational level. Data was generated iteratively in four sequential phases, namely: 1) observational participation; 2) document analysis; 3) in depth interviews of key informants; and 4) an online survey. The online survey was extended beyond the ENSI membership to include members of FEE to expand on themes generated in earlier phases. Data collection occurred over a period of five years from September 2008 to August 2013 (Table 29).
<table>
<thead>
<tr>
<th>Phase</th>
<th>Data source</th>
<th>Analytical approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Document analysis (September 2008 to August 2013)</td>
<td>ENSI constitution, strategic plans, meeting minutes, newsletters, project proposals, evaluation reports and research articles.</td>
<td>Qualitative content analysis utilizing NVivo to establish the operating contexts of ENSI including organizational governance structures and program delivery processes across geographical, organizational, and cultural dimensions [19].</td>
</tr>
<tr>
<td>3. Key informant interviews (conducted via Skype) (February 2012 to April 2012)</td>
<td>Nine of ENSI’s organizational leaders (Executive, Country Coordinators, and Critical Friends) including those based in Europe and Australia.</td>
<td>Deductive thematic analysis using eight themes derived from phase 2, namely: 1) accountability to stakeholders; 2) network development; 3) roles in EfS facilitation; 4) governance structure; 5) network democracy; 6) relevance to participants; 7) complexity of the learning network; and 8) scalability. Data was coded using NVivo and relationships between codes were validated using Leximancer.</td>
</tr>
</tbody>
</table>
Table 29. Continued.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Data source</th>
<th>Analytical approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Survey May 2013 to August 2013</td>
<td>Online survey questionnaire of organizations representing over 60 countries and 1000’s of members. The survey recipients were identified as facilitators of EfS at a leadership and/or project manager level through their roles as members and/or affiliates of the ENSI and FEE DGNs. 13 organizations provided responses to the survey.</td>
<td>The survey extended and deepened insights generated in the first three phases and focused on the approaches to facilitating EfS at multiple scales applied by DGNs at an organizational level.</td>
</tr>
</tbody>
</table>

Thematic analysis of data generated in Phases 1 (Observer participation) and 2 (Document analysis) was combined with a review of the related literature across the fields of EfS, DGNs, scalability, globalization and monitoring and evaluation to establish a code manual grounded in the established theory and practice of EfS and the specific contexts of ENSI. Key themes were deduced through a 6 stage process of codification resulting in the code manual identifying and describing 8 overarching themes (refer Table 29), and 54 more detailed sub themes [20]. This process provided a consistent structure for the generation and analysis of interview data (Phase 3) and ensured congruence between the theory and dynamic practices of EfS.

Following a standardized interview process based on the 8 themes, analysis of interview transcripts was conducted using the analytical software packages NVivo and Leximancer. NVivo was used to explore the established themes in more detail and to identify any novel or emerging sub-themes. Leximancer was then used to establish the existence and strength of relationships between themes/sub-themes. This approach improved the methodological rigor through the development and demonstration of a path of analytical evidence and analysis maintained throughout the research process [21].

The application of NVivo and Leximancer resulted in 54 sub themes and detailed, rich insights into the experiences of key informants in the facilitation of EfS at the organizational and program levels. These findings were subsequently used as the basis for an online survey of ENSI and FEE members to gain broader insights into the applicability of these findings across the network and similar organizations. Interview responses support data collected throughout the document analysis phases and are
referenced in 22 instances throughout this paper. Survey responses were used to support specific statements provided by respondents and are referenced 8 times in addition to being presented in more detail in the tables presented here within. The survey response rate was 22%. Although this does not represent a high response rate, the characteristics of respondents are representative of the wider sample across the two dimensions central to this study (i.e., DGNs membership and facilitation of EfS) [22–24].

All data generated through the interviews and survey described in Table 29 was de-identified and referenced throughout the body of the article. Interviewees were referred to by data type and number (e.g. Interviewee #1) within the reference section to ensure the anonymity of responses.

5.3.1.3 Results and Discussion

The findings reveal six dimensions, relevant at the organizational level, which enhance the delivery of EfS through a DGNs including: 1) developing a community of practice; 2) planning for phased organizational development; 3) structured decentralization using a strategy-node-program framework; 4) linking research to practice; 5) ensuring relevance through contextualized approaches; and 6) monitoring and evaluation of processes and outcomes. The findings indicate that since ENSI commenced as an Organization for Economic Cooperation and Development (OECD) initiative in 1986, the incorporation of these six dimensions into organizational structure, strategy and on-going development has supported substantial achievements in the delivery of EfS over 26 years of continuous operation. In particular, ENSI has delivered fifteen major EfS projects with individual project budgets in excess of €50,000 and involving over a thousand teachers and schools located in over 25 countries [1–11, 25]. ENSI was recognized as having a wider applicability to the discipline of EfS internationally through the early leadership role taken as a key contributor to identifying the progress and possibilities for the United Nations Decade of Education for Sustainable Development (UN-DESD) in European Union member states [26]. In addition, ENSI has influenced the agendas of national governments by providing key inputs to the development of international EfS policy, such as that of European countries (e.g., Hungary and Italy) where ENSI played a crucial role in the process of integrating EfS and Environmental Education (EE) as a core component of the national curriculum [1].
Developing a Community of Practice

Consistent with the guiding intent of ENSI’s strategic plan, the interests of the ENSI community developed dynamically and often arose from sharing lessons across diverse spatial and cultural contexts [27]. ENSI identified itself as a “community of practice (CoP) for research, development and innovation exchange in the field of environmental education and education for sustainable development (EfS)” [28] (p. 5). As highlighted by one participant, “a main strength [of ENSI] was the sharing of information across participating countries…learning a great deal about what others were doing” [29]. Similarly, another participant identified that ENSI fostered relationships and community-building by “bringing people together from all sorts of organizations in an inclusive nature” [30]. True to the nature of a CoP ENSI was characterized by participants’ interactions and engagement regarding shared concerns, challenges and passion for a particular topic [31–33]. In ENSI’s case this “topic” was EfS and engagement was facilitated through the international exchange of experiences (i.e., programs) grounded in environmental understanding, dynamic qualities of EfS and active approaches to teaching and learning [34]. The importance and interpersonal significance of these relationships and shared experiences was reinforced by one interviewee who likened the ENSI DGNs to a family “…we say at ENSI it is like a family so the friendship and the openness of ENSI colleagues and the very good human connections and relationships are very important” [35]. Consistent with ENSI’s organizational strategy, survey respondents ranked the establishment of a CoP as the most important role performed by a DGNs from the options provided (Table 30).

Table 30. Survey respondent perceptions of the most important roles of a Decentralized Global Network (DGNs).

<table>
<thead>
<tr>
<th>Potential DGNs Role</th>
<th>Rank *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishing a community of practice</td>
<td>1</td>
</tr>
<tr>
<td>Creating learning networks</td>
<td>2</td>
</tr>
<tr>
<td>Linking theory with practice</td>
<td>3</td>
</tr>
<tr>
<td>Educating others in EfS facilitation</td>
<td>4</td>
</tr>
<tr>
<td>Providing structure through Administration</td>
<td>5</td>
</tr>
<tr>
<td>Advancing the body of knowledge for EfS</td>
<td>6</td>
</tr>
</tbody>
</table>

* A ranking of 1 indicates the role considered most important and 6 least important.
In explaining the allocation of rankings, survey respondents identified various organizational functions that further serve to illustrate the essential, but diverse roles of a CoP in the ENSI DGNs. For example, a CoP was described as: the “backbone” of a DGNs (Survey Question 1, Respondent #1); addressing the challenges of communication; providing support that was limited or lacking in particular contexts; and as a way of integrating more broadly with communities. These findings highlight the importance of developing a CoP in conjunction with an enduring organizational structure, a focus on learning, and the development of networks more broadly.

The ENSI strategic plan, and previous research relating to ENSI’s key roles in education, identified the development of stable learning networks and cooperative linking of participants (e.g., teachers to schools, and communities to workplaces) as key strategic objectives [15,27,34]. Correspondingly, the creation of learning networks was identified as the second most important role by survey respondents (Table 30). Analysis of both interview and survey data demonstrated a close relationship between learning networks and CoPs with one respondent indicating that “…these functions are interconnected and interdependent” (Survey Question 2, Respondent #5). Learning networks were formed within the ENSI CoP as a result of collaborative and experiential learning communities that consisted of participants connected to each other through personal and/or program objectives [36]. Whilst ENSI’s CoP was more broadly structured, less formal and regulated, its learning networks were more institutionalized and established to support specific ENSI program objectives [37]. The interactions occurring within the CoP were likely to be significantly structured by the identified areas of interest and formal controls of its participants (i.e., organizations, individuals and government bodies) where, for example, those participants represent the policy and research interests of differing member countries [38]. Learning networks played a supporting role in the development of the ENSI CoP linking network structure (i.e., programs) and participants around a sense of common learning [39], a relationship that was generally supportive of ENSI’s facilitation of EfS.

The ranking of roles (Table 30) associated with connection, collaboration and community were identified as of higher importance to a DGNs facilitation of EfS than, for example, the administration of the network itself or the broader outcomes delivered by the facilitation of EfS, such as, advancing academic knowledge. This result indicates that the ENSI DGNs considered network-wide achievement, learning and the creation of
a common identity [40] of most importance to the facilitation of EfS. This assertion is supported by the survey data, indicating the importance placed on facilitating communication and a network structure grounded in expertise, interests, common learning and a sense of network identity [40,41]; as well as, through its engagement processes regarding collective concerns, challenges and passion for a particular topic [32,33,42] shared amongst the participants. The ENSI case demonstrates that “the creation of a community generates a strong incentive and motivation [to facilitate EfS]” (Survey Question 3, Respondent #6). ENSI’s implementation of learning networks linking participant interests to relevant EfS research problems (e.g., quality criteria, learning environments, etc.) is supportive of literature identifying CoPs as well-established mechanisms through which to provide structure for educational programs grounded in expertise, interests, common learning and a sense of network identity [40,41].

**Planning for Phased Organizational Development**

ENSI was established at a time when the need was identified to fill a gap in education and learning by addressing EfS and EE at a school-community level [43]. The OECD identified that an organization or program had not yet been established in Europe that addressed these areas together, their response was the launch of ENSI. They encouraged their members to engage with the development of the evolving CoP and then allowed ENSI’s governance structure to emerge unabated in it’s early phases [43]. ENSI was encouraged by the OECD to remain steadfast in its objectives to align environmental education and EfS with the concepts of initiative, independence, commitment and, for example, a readiness to accept responsibility [15]. ENSI did, however, revise organizational strategy a number of times throughout the first fifteen years of its operation implementing a significant strategic alignment process in 2005 as it entered a new phase of organizational delivery [3]. In the mid-1990’s ENSI was transformed from a sponsored project to an independent organization and, despite this significant evolution, did not deviate from its founding objectives [14].
Understanding the ENSI Organizations’ development cycle was important to examining the dimensions through which it has facilitated EfS at an organizational level, as evidenced by a participants comment:

I think…ENSI…has changed so dramatically in the three phases. The first phase was cutting edge, action research…you know leading in that area. The second stage was (where) we tried to influence policy and sort of up-scale the good practice; and, the third one was just a group of people coming together and sharing resources [44].

The ‘Waves of Development’ (Table 31) recognized the importance of ENSI’s history of phased development to its current organizational delivery and how the network has evolved since its inception [1, 14]. Each phase, or “Wave” as it has been presented, in ENSI’s history provided significant learnings regarding the changing strategic contexts and geo-political conditions in which the organization was required to navigate.

<table>
<thead>
<tr>
<th>ENSI Wave of Development</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
- Over 65 schools involved in projects/research representing over 20 countries.  
- Over 145 teachers/teacher educators participating.  
- Focusing on linking project development and academic research.  
- Commencing membership fees and project funding/grants sustain the organization. |
| The Second Wave: Consolidation (1989–1994) | - OECD (CERI-) defined ENSI as a full project for the period 1989 to 1994. 10 more OECD members join ENSI.  
- Over 135 schools involved in projects/research representing over 25 countries.  
- Over 765 teachers/teacher educators participating.  
- Involved in policy review, action research, and EfS evaluation projects (e.g., Sustainable Development in the Netherlands).  
- Commencing and continuing membership fees and project funding/grants sustain the organization. |
<table>
<thead>
<tr>
<th>ENSI Wave of Development</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| The Third Wave: Expansion (1995–2004) | - ENSI concludes as an OECD (CERI-) project (1994) and commences as an independent network under the OECD umbrella.  
- Over 475 schools involved in projects/research representing over 25 countries. Some members leave ENSI.  
- Over 2740 teachers/teacher educators participating.  
- Commenced a network development and decentralisation phase including scaling out projects to other regions/countries more actively.  
- Commencing and continuing membership fees and project funding/grants sustain the organization. |
- ENSI contributed in the early stages to the development of the UN-DESD. In the following years they both scaled-out and back in their projects. They amended their organizational structure and witnessed a decline in both active projects and Country membership.  
- ENSI transitions its DGN in 2009 to an International Non-Profit Association (INPA), a legal and governance structure under Royal Belgian Decree, that afforded them the ability to maintain both a decentralised network and program delivery organizational structures.  
- Fee for Service/online collaboration models introduced to augment membership fees and project grant funding.  
- In 2005, 24 countries were ENSI members. By late-2013, this number had reduced to 19 countries with 10 representing full-fee paying membership. |

ENSI’s transition between waves was facilitated by an on-going process of strategic development addressing issues related to its partners and regional networks [1]. ENSI concentrated on “reinventing themselves every three or four years” [44] ensuring organizational and program objectives and renewed strategy aligned to current local and global priorities (e.g., relevance to participants). As supported by a participant’s response:
ENSI had to follow a clear strategy by following clear research questions which arise through the years in environmental education [45].

Organizational development has been dynamic and “the [ENSI] influence and the power has changed quite dramatically over the years” [44]. For example, the transition from wave one to wave two in ENSI’s development was characterized by a scaling up (i.e., organizationally) and out (i.e., geographically) of programs and membership [19]. ENSI “refocused on key priorities” and questions at planned intervals [44] and envisioned this process of continuous organizational development as occurring through the adoption of clear research direction and objectives [27].

The historical development and evolution of ENSI demonstrates a “complex and systemic approach” [46] to phased development and the impact upon organizational structure, governance, strategy, systems and multiple functional connections as the organization matures and enters/exits cycles of growth and decline [47]. These organizational developments impacted upon ENSI’s facilitation of EfS as is evidenced throughout the fourth wave, which is characterized by ENSI’s most significant change in structure and corresponding decline in membership and participants. ENSI’s structured approach illuminates the importance placed by the OECD and ENSI Leaders upon the organization being resolute in its strategy-oriented approach from the outset, yet flexible enough to be able to revise and self-regulate strategy throughout the years in order to transition between development phases. Changing influence and power at local and global scales required ongoing re-development of strategy to accommodate differing development phases [19]. ENSI’s organizational documents chronicle this phased development and the longevity of the organization lends credence to the success of it’s approach as it relates to organizational delivery [1–11, 48]. The application of an entrepreneurial approach towards meeting organizational goals and towards changing organizational contexts [49] is an approach evidenced by the ENSI case and demonstrates the importance of DGNs more generally planning for the challenges and impacts of transitioning between development phases given the complex systems of interconnections that comprise the process in which they deliver EfS over longstanding periods of time [50].
Structured Decentralization Using a Strategy-Node-Program Framework

ENSI’s approach to connecting EfS research, practice and policy-making was to apply a framework of structured decentralization that ensured the organization met its aim to create stable, yet dynamic, learning networks, generate local knowledge and meaningful discourse and foster democratic participation [34]. For ENSI, the structured approach to decentralization was reliant upon the development of regionalised learning networks established through local partnerships and alliances [27] which link schools, families, community, and workplaces together [43]. Participants indicated that ENSI’s application of a ‘regionalized’ approach supported its facilitation of EfS:

ENSI got all of that right. It’s a global organization that works through the regions at a local level…as well as the change in this area at a very practical level. It is about supporting a true regional outlay but on a global level. It’s a fantastic example of a decentralized network [44].

As indicated in Section 3.1, ENSI facilitated the formation of a CoP to connect participants more broadly and informally to the organization. Learning networks were formed at the program level to provide for a more formal network structure [38]. As such, all ENSI participants were members of both the organizational CoP and those specific learning networks formed at the program scale grouping themselves around particular program objectives, themes and participant interests [48].

ENSI adopted an decentralized approach to facilitating learning and participation that made a concerted effort to engage the CoP and its collection of learning networks in simultaneous bottom-up and top-down methods of governance facilitated by a central hub linked closely to each regional node (Figure 5). As summarised in the following quotation from a participant “[ENSI] is an international network…development network, point of reference, something that we learn from the international community and we also contribute to” [45]. By identifying the DGNs and its principles as a “point of reference” for participants and the broader community, ENSI’s decentralized approach aided the translation of centrally developed strategy into contextualized understanding and practice at a local level [1, 14] utilizing the regional nodes to translate strategic aims into program objectives [34].
The implementation of a strategy-node-program framework as a means to facilitate EfS is a feature unique to ENSI. For example, there are tens of thousands of civic networks active internationally [51] and, whereas, these types of global social change networks are not dissimilar in some aspects to the structure of ENSI in that they are non-hierarchical and decentralized, they are often loosely organized across the organization and accountability is highly diffuse [52]. In contrast, ENSI demonstrates an approach to network decentralization that engaged members in a manner that is both flexible (i.e., CoP) and structured (i.e., learning networks) [27, 32]. The approach involved the adoption of a center of power (i.e., ENSI Secretariat and Executive) that set the broad strategic direction for the network, but ensured that the regionalized nodes the CoP was comprised of were free to self-organize through program delivery and were accountable for their work at the local level [34]. ENSI achieved this by enacting a formal structure to ensure the organization addressed participant interests in an inclusive and democratic manner including, procedural requirements such as setting the annual strategic direction for the organization each year at the Annual General Meeting (AGM) [27]. The decentralized model included at each regional node a Country Coordinator to manage the connection between organizational strategy and programs, and an Academic Representative providing pedagogical support to the program managers. The Coordinator...
and Academic Representative were entrusted with the overall coordination of ENSI programs aligned to strategic organizational objectives, however, they were encouraged to contextualize approaches for regional priorities and facilitate EfS through, for example, the regions schools and/or wider educational curriculum [27]. ENSI’s approach to decentralization provided autonomy to the Country Coordinator and Academic Representative to operationalize at the program level (i.e., the learning network) strategy developed at the more central level. Whereas a failure of decentralization could be attributed to a lack of understanding of how to effectively participate because of norms associated with traditional societal hierarchies [53], ENSI’s decentralized framework afforded participants the opportunity to remain accountable to organizational objectives whilst encouraging wide-ranging opportunities to individualize participation in the DGN.

ENSI’s approach supported the development of dynamic learning networks which are non-hierarchical, flexible and supportive of the establishment of professional exchange [54]. A success of ENSI has been attributed to its position as an interface between the learning networks constructed and the more hierarchial networks of its participants (e.g., schools and government) [48]. The formation of learning networks embedded within the ENSI framework complement and to some extent act as a substitute for hierarchial networks [55]. ENSI recognized that the regionalized and structured approach to decentralization that occurred through the formation of learning networks was an effective tool in which to deliver EfS within diverging systems and has been identified throughout the field’s literature [56,57] as applying an approach that effectively links decentralization to democratic process [32,53,58] an important aspect of EfS delivery [56,59]. An improved understanding of the nature of a structured and decentralized approach is timely as the United Nations Educational, Scientific and Cultural Organization (UNESCO) recently acknowledged that greater decentralization characterized by a flexibilie and autonomous approach increased the likelihood that EfS initiatives and projects were to be adopted [59].

**Linking Research to Practice**

ENSI’s approach to the facilitation of EfS connected the development of ideas and insights to implementation tools and structures that enabled EfS programs to facilitate realistic practices [60]. ENSI supported theoretical notions coupled with practical experiences through the implementation of joint research and action [50] and set about
fostering research-community-school collaboration through the assembly of inter-agency networks crossing traditional boundaries between research centers, government, interest groups and learning organizations [61]. Through the application of this approach ENSI connected teachers, teacher-educators, policy makers and research groups together supporting the link between these dimensions. ENSI’s strategic planning documented these synergies as primary to the DGNs organizational objectives [27,35].

ENSI was identified (i.e., pre-2000) as the only international research network with a primary aim of connecting research and government authorities with school practices [1]. A participant described this approach as establishing a “triangle of policy, practice and research which is a really good marriage” [30]. ENSI’s approach rejected the assumption that there should be a traditional separation between school and society in favor of connecting these dimensions through open and experiential questioning and shared interests [58]. As indicated by one respondent “this kind of interface of teachers whom are highly engaged in their school projects with governmental people engaged in national programs, and with researchers trying to find out how to improve EfS and EE programs makes up the strengths of ENSI” [42]. Participants indicated that it was of key importance to the ENSI Organization that it maintained the interface across a number of levels of research and government in the specific field of environmental education and EfS [45, 62]. ENSI’s role in this process included what one participant referred to as advancing:

…the policy of education, the practice of education, the teacher in the school and the research …to be a kind of bridge between the realities that in many cases don’t work together [63].

ENSI’s leaders described how the DGN would engage with its network to connect its broad membership together around clear research-practice questions as follows.

…the strategy was to always have an ear into the real national programs and then to reflect what exactly the open questions are. And, then to bring these open questions into the network of researchers and government authorities to find out what are the most important questions we have to deal with today [45].

To facilitate this “bridge” ENSI positioned itself to “influence the development of national programs” [45] through a membership base that was primarily composed of government representation partnering with the ENSI organization to assist in influencing local EfS curricula at departmental and government levels [1, 34]. This approach was
acknowledged by government authorities (e.g., Austria, Germany, Italy) as being integral to the establishment and mainstreaming of EfS programs in their schools [1].

ENSI was cognizant that “in order to create good practices it was important to link knowledge with practice” (Survey Question 2, Respondent #7) and recognized that addressing the nexus created between research and practice was a fundamental aspect of their facilitation of EfS, as reflected in the response of this participant:

The biggest challenge of ESD (Environmentally Sustainable Development) is to transform ambitious theories into practice. There is huge need to help practitioners to develop practices, theoretically well-established practices, which fit into the reality of everyday educational practice (Survey Question 2, Respondent #8).

The translation of conceptual understanding and research into opportunities to put learnings into practice remains a key factor of success in the linking of people and organizations to local and global sustainability goals [64]. ENSI’s approach of linking research to practice contributed to an improved understanding of what is referred to as clear researcher-practitioner collaborations [65], whereby, the researcher and practitioner may not view the research process in the same way, however, they are able to harness this tension to meet program objectives [66]. The complexity of this process highlights the importance of DGNs translating strategic and research objectives into EfS policies and practices as a key component of EfS facilitation.

**Ensuring Relevance through Contextualized Approaches**

ENSI’s approach to delivering programs across temporal, spatial and cultural scales necessitated that the facilitation of EfS was contextually relevant to accommodate the multiplicity of cultures and participants comprising the DGN. Relevance to individual and wider community concerns and sustainability issues was recognized as a central principle of conducting EfS across these dimensions [67]. Embedding contextually in ENSI’s approach to EfS has been recognized in previous research [54] and is highlighted as an innovation by ENSI itself [68]. A focus on context-specificity ensures that ENSI recognises the need to empower schools, teachers, and researchers to ensure equality in the planning and delivery of programs that are framed in connection with, as opposed to in isolation of, the wider society and local contexts [68].

The framework and approaches identified in Sections 3.3 and 3.4 establish a collaborative arrangement between participants across varying scales. ENSI adopted the
approach of developing a different project in differing countries and regions [1] to accommodate local contextual requirements, encourage relevance to participants’ objectives and to maintain consistency with organizational goals, as highlighted by the following response.

…they [ENSI] reinvent themselves…they refocus key priorities and they always make sure they are linking relevance to, for example, government policy [44].

Participants recognized that relevance “makes it (EfS) practical and leads to a greater commitment and long term involvement” (Survey Question 14, Respondent #2). Correspondingly, survey responses supported the perceived importance of relevance to a DGNs facilitation of EfS (Table 32).

**Table 32.** Survey respondent perceptions of the most important aspects of a DGNs culture and values to the facilitation of EfS.

<table>
<thead>
<tr>
<th>Role</th>
<th>Rank *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevance to the stakeholders that both deliver and experience the facilitation of EfSD to ensure the attraction and retention of organization members and project participants.</td>
<td>1</td>
</tr>
<tr>
<td>Accountability to key stakeholders including, but not limited to, project/organization funders, research participants, and organizational staff.</td>
<td>2</td>
</tr>
<tr>
<td>Democratic organization whereby all members have a say.</td>
<td>3</td>
</tr>
<tr>
<td>Monitoring and evaluation systems in place to evaluate meeting EfSD facilitation goals and objectives.</td>
<td>4</td>
</tr>
</tbody>
</table>

* A ranking of 1 indicates the role considered most important and 4 least important.

In referring to ENSI’s programs a participant indicated that when it came to EfS programs “…one size does not fit all” (Survey Question 12, Respondent #5). ENSI aligned objectives to participant motivations for connecting to the network from the outset through establishing relevance, an important construct, as it was identified that “…initiatives that lack relevance to multiple partners will engender low commitment levels and are more likely to have a short life span” (Survey Question 14, Respondent #1).
ENSI addressed relevance through a contextual and research led, in contrast to, a content focused approach. “(ENSI) was not dedicated on the content such as air pollution, it was more dedicated on the questions that arose through collaboration with pilot schools in the regions” [45]. A contextualized approach provided ENSI the opportunity to reframe programs to address varying participant requirements by embedding consistent research questions within diverse content. By way of example, ENSI’s Learnscapes program addressed the question of “how students learnt by doing” through interactions in differing outdoor environments (i.e., Learnscapes). The Learnscapes were constructed to meet cultural or spatial demands and were vastly different located in, for example, Australia and across European countries. The research questions remained the same (i.e., how students learnt by doing) and could be posed to participants regardless of varying contextual requirements (e.g. physical locations). An appreciation of the differing contextual needs, driven by differing physical environments is vital if programs delivered by DGNs are going to function across spatial and cultural boundaries.

ENSI’s contextualized approach to EfS programs addressed the increasingly global nature of EfS facilitation, including the reframing, as opposed to reforming, of information and knowledge so that it can be understood from multiple frames of reference [69]. In this way, contextualization accommodated shared EfS goals, values and engendered a common vision [70]. ENSI delivered programs that catered for a range and variety of individual and locally determined needs. The significance of which is supported by literature which identifies that implementing EfS programs without taking due care for an understanding of contemporary society and culture, or paying only cursory attention to local context or relevance to participants, may limit rather than foster approaches to, and perspectives of, EfS [71–73].

Monitoring and Evaluation of Processes and Outcomes

ENSI’s monitoring and evaluation strategy was established as an OECD Centre for Educational Research and Innovation (CERI-) requirement at the outset of the Organizations development [74]. CERI recognized that, in general, DGNs funding should be directed towards evidence-based programs and the importance of scaling the impact of these programs should be addressed [75]. Formal evaluation was incorporated into ENSI’s delivery of programs by requiring participants to report back progressively to the Program Manager and/or Country Coordinator regarding advancement towards
organizational and program objectives. These “reports” were in turn evaluated by the ENSI Executive annually at the AGM [48]. CERI established this process to ensure ENSI members were accountable for the preparation of evaluation reports upon program completion and that these reports could be utilized by both ENSI and CERI to improve upon organizational delivery, to monitor progress toward program objectives and to influence the further development of ENSI [48]. ENSI’s support for this approach was substantiated through a dedicated section of their most recent strategic plan focusing upon progress reviews and ongoing evaluation processes [27].

Interview respondents supported ENSI’s approach to monitoring and evaluation identifying the importance of evaluation frameworks to ENSI’s strategy as highlighted by the following participant’s response:

I think the networks that have been strategic have done very well and strategic means rethinking, reviewing, engaging, constantly rethinking what you need to do better, but also what you need to do different [44].

Previous ENSI research supported the importance of regularly discussing, reflecting and debating processes and delivery of program outcomes [14]. Further justification for ENSI’s approach to evaluation was made evident through ENSI’s influence as an early contributor to the monitoring and evaluation review process UNESCO enacted to inform its global reporting strategies (Interviwees #4 and #6). However, although considered important, interview responses also indicated that the need to manage limited resources, both human and financial, provided ENSI’s organizational leadership with a difficult task as “…we are always fighting for money…” [63] for program delivery in order to “stay afloat”, as opposed to delivering robust monitoring and evaluation processes [62, 76].

The monitoring and evaluation processes that ENSI embedded within its organization are accepted by participants as an integral part of EfS facilitation in general [74]. However, the findings demonstrate disparity between the perceived importance stakeholders place upon monitoring and evaluation processes in general and the actual importance to facilitation of EfS they attribute to these processes. These findings have significant implications for DGNs more generally as the growing body of research in the area [77–83] suggests that the implementation of monitoring and evaluation and indicator frameworks to EfS facilitation, and sustainability in general, will continue to gain in importance and the significance of the implementation of these frameworks should certainly not be marginalized.
5.3.1.4 Conclusions

The facilitation of EfS through DGNs is a well-established practice (Duggan et al., 2013). The findings identify the characteristics of the ENSI DGNs operation at an organizational scale including an evaluation of the structure, conditions and motivation required to facilitate EfS. In addition, the approach taken towards addressing the nexus created between policy, practice and research was implicated as important to the ENSI DGNs facilitation of effective EfS as the approach addresses the complexity inherent within the delivery of EfS across multiple scales. The article addresses the importance of monitoring and evaluation to inform both the effectiveness and processes underpinning EfS, and to assist DGNs more generally to identify the conditions necessary for EfS facilitation to be effective. However, several constraints to the implementation of robust monitoring and evaluation were evident (e.g., funding and time) and these constraints warrant further investigation. Particularly, at the juncture when scaling EfS has been identified as a global priority in UNESCOs DESD Final Report [59] and the supporting document “Roadmap for Implementing the Global Action Program on Education for Sustainable Development” [84]. The article contributes to the body of knowledge relating to organizational approaches to EfS facilitation that are both global and regional and located across various spatial and cultural scales.

Acknowledgments

The authors acknowledge the contributions of the Environment and School Initiative (ENSI) and the research support provided by the Faculty of Arts and Business and the Sustainability Research Centre at the University of the Sunshine Coast, Queensland, Australia.

Author Contributions

Michael S. Duggan, Timothy F. Smith and Dana C. Thomsen conceived/designed the methods and contributed materials/tools to the process of analysis; Michael S. Duggan collected the data and conducted the analysis; Michael S. Duggan, Timothy F. Smith and Dana C. Thomsen wrote the paper with Michael S. Duggan the primary author.

Conflicts of Interest

The authors declare no conflict of interest.
References


29. Interviewed by Michael Duggan. Brisbane, Australia. Skype Interviewee #17 of ENSI Project Manager/Curriculum Coordinator. 17 February 2012.


46. Interviewed by Michael Duggan. Brisbane, Australia. Skype Interviewee #4 of ENSI Project Manager/Secretariat. 28 March 2012.


76. Interviewed by Michael Duggan. Brisbane, Australia. Skype Interviewee #12 of FEE Board Member. 23 August 2012.


As was demonstrated by ENSI’s Four Waves of Development (Table 31) the DGN has been progressive in its approach to organizational incubation, development and maturity. In fact, after over 20 years of operation, ENSI still remained fixated on its original objective of innovation and action research in the field of environmental education, albeit, at a differing scale from that in which it had been conceived and with an evolving set of drivers and an urgency that required an increasingly broad approach (ENSI, 2005). In fact, the ENSI DGN approach was premised on the assumption that synergy between theoretical notions coupled with practical experiences was achieved through joint research and action (Colucci-Gray, Camino, Barbiero, & Gray, 2006), a strategy ENSI documented as primary to its organizational objectives (ENSI, 2005). ENSI’s progressive organizational (i.e. increasing network members) and geographical (i.e. increasing representation of member countries) growth throughout waves one, two and three is evidence of it’s application of a decentralised model, and its applicabilty to the wider discipline of EfS internationally as is demonstrated by ENSI's early leadership role in identifying for UNESCO the ‘progress and possibilities’ for the DESD in European Union member states (Mula and Tilbury, 2009). In 2005, the development and publishing of a Strategic Plan further exemplified ENSI’s focus on continual improvement. Continual development and improvement has characterized ENSI’s progress and this is confirmed
by the longevity in which it has remained in operations (i.e. 1988-present day) and the ongoing delivery of funded, multi-faceted and well-documented EfS programs as are in evidence in the case study examined.

The author concludes with a note commenting on the association between the organizational dimensions noted in the previous findings and their translation to operational dimensions at the program level, which become apparent in subsequent sections of this Chapter. For example, at the organizational level the operations of DGNs are contingent upon three base needs: 1) funding; 2) participants; and, 3) programs. The importance of these needs has recently been supported by assertions that the attraction and retention of funding and participants for EfS programs is an item required of networked organizations engaging with the priority actions of the GAP-ESD (UNESCO, 2014). The author asserts that if any one of these three factors is not available to the DGNs, they would most likely be unable to facilitate EfS regardless of the other two. DGNs appear to be highly aware of the above three needs and place a significant amount of effort into the development of Communities of Practice that provide them with a strong framework through which to develop and facilitate programs. The CoPs usually achieve this through binding the participants and programs together around a common research frame and/or methodology. The participants form networks that deal with specific research interests and go looking for funding to develop the programs that address these interests. These observations link the reciprocal impacts of the organizational and program levels together.

Also, this operationalization of organizational strategy is a key enabler of successful EfS facilitation is further unpacked. As identified in the previous journal article, the analysis of key documents uncovered six dimensions, which identify the approaches taken by DGNs facilitating EfS at the organizational level. The following section builds upon the organizational dimensions discussed in the previous paper identifying five further dimensions characteristic of DGNs facilitation of EfS at the program level.
5.3.2 Dimensions of effective Education for Sustainability: A comparative analysis of four programs

The ENSI organization’s facilitation of EfS at a program level is characterized by the operationalization of organizational strategies and delivery of programs that are guided by their strategic underpinnings. They are, however, realized on an increasingly micro-level by comparison to that which is delivered at the macro (i.e. organizational) level as examined in the previous section. For example, ENSI identifies the empowerment of schools through teacher education as a key pillar of their approach to the delivery of EfS (ENSI, 2005). Programs delivered by ENSI have conventionally incorporated teacher education into their delivery exemplifying the operationalization of this strategic intent. Teacher education has been the outcome of the formal delivery of an action research approach and this link between methodology (i.e. action research) and outcome (i.e. teacher education) encapsulates the thematic connection between theory and practice identified as one of the six key organizational dimensions.

There is a correlation between the organizational dimensions and their translation to dimensions characteristic of EfS facilitation at the program level. The next journal article unpacks these findings in more detail.

Author Contributions

Michael S. Duggan was the lead author to the publication titled Dimensions of effective Education for Sustainability: A comparative analysis of four programs providing 90% of the content of this publication. Timothy F. Smith and Dana C. Thomsen provided 5% of the content each assisting in conceiving/designing the methods and contributing materials/tools to the process of analysis. Michael S. Duggan collected all of the data and conducted all of the analysis.

Michael Stewart Duggan  Timothy F. Smith  Dana C. Thomsen
Dimensions of effective Education for Sustainability: A comparative analysis of four programs

MICHAEL S. DUGGAN, TIMOTHY F. SMITH and DANA C. THOMSEN

ABSTRACT

Education for Sustainability (EfS) programs respond to the growing impetus to build a more sustainable future and have continued to gain recognition over the last fifteen years, in part driven by the recently concluded United Nations Decade of Education for Sustainable Development (UN-DESD). The reorientation of educational programs to address sustainability has been acknowledged as a key thrust of EfS. In particular, EfS programs are progressively bridging the gap between theory and practice through the provision of pedagogical support for teachers, teacher-educators, and policy makers, and in assisting the communities to develop knowledge, understanding and skills for sustainability. However, there is limited understanding of how the proffered program-level approaches contribute to the effective facilitation of EfS through decentralized networks. In this article the authors address this gap, offering a comparative analysis of four case studies examining programs delivered by a Decentralized Global Network (DGN). The findings show five dimensions that characterize the facilitation EfS programs through DGNs, which include: 1) applying the action research approach to bridge the gap between research and practice; 2) facilitating EfS programs through learning networks; 3) a decentralized approach to program delivery; 4) mainstreaming EfS programs; and, 5) formative and summative monitoring and evaluation of programs. The findings illustrate that these five characteristics contribute to effective EfS facilitation by linking research priorities to teaching and learning practices, and enhancing multi-stakeholder networks at varying geographic and organizational scales.

Keywords: education for sustainability; scalability; action research; mainstreaming; learning networks; facilitation; program implementation

5.3.2.1 Introduction

Education for Sustainability (EfS) programs have received increased recognition because of the growing conviction that education shapes a more sustainable future as
reflected through the United Nations Decade of Education for Sustainable Development (UN-DESD), which concluded in late 2014 (Hopkins, 2014; UNESCO, 2014). Creating sustainable learning environments, not just teaching and preaching—sustainable development, are recognized as priorities for facilitating effective EfS (UNESCO, 2014). To realize these intentions, effective EfS programs acknowledge a need for relevance to the participants, the wider educational objectives, and the everyday lives of the individual learners. In addition, they should be empowering, multi-perspective, interdisciplinary, and evaluated (Athman & Monroe, 2001). Effective EfS programs will also involve multi-stakeholder relationships and varying geographic and organizational scales (Duggan et al., 2013) and are often focused on reorienting public understanding and awareness of sustainability more generally through exposure to education and learning (Taylor, 2014).

Examining programs of a Decentralized Global Network (DGN) provides an opportunity to study the facilitation of EfS at the facilitative level. This article provides a comparative analysis of four program case studies illustrating key dimensions of EfS facilitation at the program level, whilst referencing the embedded knowledge and skills that have been found relevant to EfS facilitation throughout the period of the UN-DESD (Tilbury & Mulà, 2009). The comparative analysis utilized a process-oriented approach inclusive of common criteria to identify correlations (Mog, 2004; Ragin, 2003). The analysis of the cases also explores how a DGN has addressed the mainstreaming of EfS programs and the research-practice gap to realize broad-reaching organizational and EfS objectives. In addition, this article extends previous research examining DGNs’ organizational approaches to EfS facilitation, therein, contributing to an understanding of how DGNs’ programs address sustainability issues and agendas more broadly (Buckler & Creech, 2014; Duggan et al., 2015c).

5.3.2.2 Methods

Programs of a DGN [The Environment and Schools Initiative (ENSI)] were investigated through the varied perspectives of multiple participants, inclusive of the interactions between these participants and the programs they managed and facilitated (Feagin et al., 1991). This process entailed participant observation and the conduct of eight key informant interviews with DGN program managers, pedagogical coordinators, and DGN executive members.
Because the DGN’s programs had been delivered over a continuous period of 26 years, in numerous languages and by hundreds of participants within 20 countries, there was widely divergent data availability for programs delivered throughout their entire period of operation (Duggan et al., 2015c). Multiple case studies were selected to strengthen the results, increase the robustness of the theoretical approach and assist in drawing out conclusions from a variety of data sources and contexts (Baxter & Jack, 2008; Yin, 1995). To ensure substantive data could be gathered, case study selection focused solely on programs for which primary and secondary data could be collected and analyzed (Tellis, 1997). In consequence, four case study selection criteria were identified as a means to assisting in this process, including: 1) access to program managers; 2) access to pedagogical and/or senior advisors; 3) access to program evaluation report(s); and 4) binding the selection of cases by time and activity. Applying the case study selection criteria resulted in four case studies selected for detailed analysis (Table 33).

**Table 33. Four Program case studies**

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Criteria 1) and 2) -Access to key informants</th>
<th>Criteria 3) - Evaluation/Progress Report(s)</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEED - Focusing on Quality Criteria</td>
<td>Program Managers, Pedagogical and/or senior advisors were available for interview. Key program documents were available for review.</td>
<td>Quality Criteria Evaluation Report prepared for United Nations Educational, Scientific and Cultural Organization (UNESCO) at conclusion of the program.</td>
<td>Pre/early UN-DESD (2002–2005). Incorporating Quality Criteria program work that started in 1995.</td>
</tr>
<tr>
<td>Comenius Lifelong Learning Programme (SUPPORT-)</td>
<td>As above.</td>
<td>ENSI* Evaluation and external (EAC-EA) Final Assessment Reports at conclusion of the program.</td>
<td>Mid UN-DESD program (2007-2010)</td>
</tr>
</tbody>
</table>
Table 33. Continued

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Criteria 1) and 2) Access to key informants</th>
<th>Criteria 3) - Evaluation/Progress Report(s)</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learnscapes</td>
<td>As above.</td>
<td>Learnscapes Evaluation Report prepared for ENSI Executive at conclusion of the program.</td>
<td>Pre UN-DESD program (1998 – 2004). Foundation of the LEARN program which concluded in 2010 and was linked to CoDeS program (2011-2015).</td>
</tr>
</tbody>
</table>

Binding the selection of cases by time and activity was identified as an appropriate means of narrowing the field of cases made available (Stake, 1995), for this study programs delivered over a minimum of 2 years were selected. The UN-DESD was also adopted as an appropriate timescale in which to bind the cases and, in conjunction with the application of the above mentioned three criteria assisted in narrowing the field to the four cases selected.

The case studies were examined through a comparative analysis approach. The aim of the comparative analysis was to highlight points of similarity and contrast. Specifically, it was envisioned that the program cases may vary quite widely in context, goals and methods; however, they could be compared based upon the criteria (Table 34) that describe the program processes and approaches each have taken (Mog, 2004). The comparative analysis criteria included: 1) program objectives and deliverables; 2) facilitation processes and methods; 3) reach (i.e. geographical/volume); and 4) products and outcomes.
Table 34. Comparative analysis applying process-oriented criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Process Questions</th>
<th>Outcome Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1: Identify Organizational/Program Objectives and Deliverables</td>
<td>What are the program objectives and what will be delivered when these goals are achieved?</td>
<td>What are the outcomes of these objective being (or not being) realized?</td>
</tr>
<tr>
<td>Step 2: Identify Facilitation Methods</td>
<td>What methods have been applied to the facilitation of EfS?</td>
<td>What has been achieved through these methods application?</td>
</tr>
<tr>
<td>Step 3: Map Reach (Geographical and/or volume)</td>
<td>What are the scales in which EfS has been facilitated?</td>
<td>How many participants have been reached? How many countries has the program been delivered in?</td>
</tr>
<tr>
<td>Step 4: Identify Products/Outcomes</td>
<td>What products and/or outcomes have been developed and delivered?</td>
<td>How do the products/outcomes compare or contrast to other programs?</td>
</tr>
</tbody>
</table>

(Adapted from Mog, 2004)

A ‘process-oriented’ comparative analysis approach was applied, distinguishing itself from other techniques that assess specific indicators, and focusing on the investigation of the process itself across a number of criteria (OECD, 2000). This process-oriented framework lends itself well to the examination of the facilitation of EfS as this form of sustainability education in and of itself is considered a process of learning (Combes, 2005; Tàbara & Pahl-Wostl, 2007).

Data collection and analysis occurred over a period of five and a half years from September 2008 to February 2014 and involved two phases of data collection: 1) in-depth case study analysis; and 2) interviews of 8 key informants. ENSI provided data and key informant contacts for the four case programs. Qualitative content analysis by means of the analytical software package NVivo was used to explore the connections between ENSI program delivery across varying scales (e.g. geographical, organizational, and cultural dimensions) (Duggan et al., 2013). All data generated through document analysis and interviews was subsequently de-identified to ensure the anonymity of responses and will be referred to by data type and number (e.g. Interviewee #1) throughout the article.
5.3.2.3 Results and Discussion

ENSI’s programs provided comprehensive case studies in which to examine the facilitation of EfS. The findings from the comparative analysis of the case studies identify aspects of ENSI’s facilitation of EfS. The comparative analysis revealed five common characteristics for the effective facilitation of EfS programs by a DGNs, they are: 1) applying the action research approach to bridge the gap between research and practice; 2) facilitating EfS programs through learning networks; 3) a decentralized approach to program delivery; 4) mainstreaming EfS programs; and 5) formative and summative monitoring and evaluation of programs (Table 35). While each of the five key characteristics is common across all four case studies, they are discussed below in turn using an example case study that best represents the conceptualization and enactment of that characteristic.

Applying the action research approach to bridge the gap between research and practice

Delivery of programs incorporating action research involved a cyclical process of critical analysis; whereby, participants conduct enquires into their own practice in an attempt to better understand, and to improve, their own practices, which in turn influenced the conditions in which EfS was being delivered (Kemmis, 2009; Koshy, 2009; Tilbury, Podger, & Reid, 2004). DGNs utilize an action research approach to address the research-practice gap recognizing that action research is a meta-practice having a significant influence upon both other practices and the conditions under which researchers and practitioners deliver EfS (Kemmis, 2009). Undertaking this approach involved DGNs encouraging participation by directing multiple actors, including teachers, students, teacher trainers, administrators and researchers, towards putting learnings into practice through the delivery of programs in schools and communities (ENSI, 2005).

Analysis of the four ENSI programs illustrated the consistent application of the action research methodology referred to by ENSI as the common research approach (ENSI, 2005). The SEED-Quality Criteria in ESD Program (SEED) is presented as an example of this approach in practice (Table 36).
<table>
<thead>
<tr>
<th>Project Name</th>
<th>Objectives</th>
<th>Facilitation Methods</th>
<th>Reach (Geographical and/or volume)</th>
<th>Products/Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEED - Quality Criteria in ESD</td>
<td>• Conceptualization of EfS.</td>
<td>• Action research</td>
<td>• 13 Country Reports collected and analyzed.</td>
<td>• Quality Criteria for ESD Schools booklet (21 languages)</td>
</tr>
<tr>
<td></td>
<td>• Use of Quality Criteria for school self-evaluation.</td>
<td>• Online e-platform</td>
<td>• Norway – 100s of schools and teachers.</td>
<td>• a comparative study</td>
</tr>
<tr>
<td></td>
<td>• A means to present the criteria to participants.</td>
<td>• Information exchange, constructive conversations and reflection.</td>
<td>• Italy – 5 to 10 schools and up to 40 teachers</td>
<td>• training courses for teachers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Surveys and analyses</td>
<td>• Germany – up to 35 schools and 100 teachers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Dissemination in networks of ‘UNECE Committee of Education for Sustainable Development’ and other main agencies.</td>
<td></td>
</tr>
<tr>
<td>Comenius Lifelong Learning Programme (SUPPORT-)</td>
<td>• The objective of the Project SUPPORT (a Comenius Lifelong Learning Programme) was to promote and enhance the quality of education for sustainable development by linking schools, research institutions and communities.</td>
<td>• Online, web-based tool (partnerships)</td>
<td>• 31 partners from 15 countries, working on collaboration among schools (<a href="http://www.support-edu.org">www.support-edu.org</a>).</td>
<td>• 4 themed booklets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Network development and collaboration (participation).</td>
<td>• Co2nnect website used by 644 schools representing 31,815 students.</td>
<td>• development of a web-based network</td>
</tr>
</tbody>
</table>
| Collaboration of Schools and Communities for Sustainable Development (CoDeS) | • Foster school-school and school-research collaboration  
• Enhance sustainable development knowledge  
• Measured impact only on the CO2nnect campaign. | • 30 Countries and 17 languages |
|---|---|---|
| **CoDeS** | • Survey analysis/ descriptive narratives.  
• Online e-platform  
• Active networking  
• Conference presentations | • 29 partnering organizations and 17 countries.  
• 15 languages  
• 175 users in direct engagement  
• 300 newsletter subscribers (At May 2013). |
| **Analysis** | • Analysis of cases of school-community collaboration (publication) Case book with 46 cases on s-c collaboration  
• Sets of indicators and a toolbox to support project partners  
• Travelling guide for reflective practitioners  
• Digital handbook for local authorities  
• teacher training sessions  
• conference presentations |
<table>
<thead>
<tr>
<th>Project Name</th>
<th>Objectives</th>
<th>Facilitation Methods</th>
<th>Reach (Geographical and/or volume)</th>
<th>Products/Outcomes</th>
</tr>
</thead>
</table>
| Learnscapes  | • Promotion of the redesign of school grounds  
• Encouraging school communities to interact with their environment  
• Linking curriculum with the use of those school grounds | • Active participation  
• Action research  
• Reflective process | • Australia – 23 Schools (pilot) increasing to between 100-200 schools.  
• Austria – Approx. 100 Schools  
• Norway – 100s of schools and teachers.  
• Finland  
• Germany – up to 35 schools and 100 teachers. | • Literature analyzing the connection between the school grounds and the community.  
• Sustainable land and building use curriculum.  
• LEARN (Learning Environments-ext. project).  
• Cooperation with OECD/CERI in project ILE. |
Table 36. The SEED-Quality Criteria in ESD program

<table>
<thead>
<tr>
<th>Program Description and Deliverables</th>
<th>Facilitating EfS through applying the action research methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The SEED program employed an action research approach in the collection of data from EfS teachers critically examining and reflecting upon their practice. Deliverables included: A comparative study of the contribution to school development offered by Environmental Education (EE) and EfS; and, Development of a virtual network in which to facilitate discussion and exchange information amongst project participants.</td>
<td>The SEED program bridged the research-practice gap by meeting both research (i.e. development of a framework and Handbook for ESD Quality Criteria and alignment with UNESCO objectives) and practice (i.e. providing a teacher reflection and development resource) parameters concurrently. The SEED program addressed ‘…research, school curricula, national authorities, policy…not addressing only one of the dimensions’ and the program facilitated a connection between educational authorities, teacher education institutes, schools and research groups and institutions (Smith, 2004). The SEED program is evidence of the action research approach being employed to meet the goals and objectives of a broader international strategy (i.e. UN-DESD) aimed at linking research and practice-based aims (UNESCO, 2005b).</td>
<td>Conceptualization of EfS. The use of Quality Criteria for school self-evaluation. Quality Criteria for ESD Schools booklet.</td>
</tr>
</tbody>
</table>

ENSI recognized the action research approach as being significant in addressing the gap between research and practice, and in response developed the SEED program to generate new knowledge both through, and in, practice (Vallenga, Grypdonck, Hoogwerf, & Tan, 2009). Participants readily identified that the facilitation of EfS was greatly influenced by incorporating ongoing learnings into program delivery based on the premise that the outcomes generated by research, and how these outcomes are transferred to participants (e.g. teachers, schools), can ‘in reality have a huge gap’ (Interviewee #10). Addressing the complex nature of the ‘questions’ asked at the policy, research and practice levels
represents one of the ‘fundamental pillars’ of the SEED approach and is ‘the basis of how
ENSI facilitates EfS’ (Interviewee #4). From the perspective of ENSI’s participants, the
success of programs (such as SEED) lay in working ‘on all systemic levels of
education…from research to curriculum to schools to teacher education’ (Interviewee
#10). Another participant identified that the ‘systemic and holistic approach to the
delivery of this program and the incorporation of a defined research methodology were
significant factors in the program’s successful delivery’ (Interviewee #14).

As formerly noted DGNs’ focus upon applying action research as their central
methodology stemmed from the recognition that there was ‘a real gap between the
academic work that was written in university about education and the sorts of practices
that were going on in schools’ (Interviewee #15). DGNs address this gap by positioning
themselves as ‘international networks connecting together the world of research and the
world of school practice’ (Interviewee #4). For example, ENSI focused attention at the
program level acting as ‘a bridge between the policy of education, the practice of
education, the teacher and the researcher’ (Interviewee #6) through programs that
implemented an action research approach. Another participant indicated that:

…the action research promotion of the early pioneers of ENSI really did a fab
job in bringing these [research and practice] together….to train and encourage
and engage teachers to participate with national research and improve the
quality of teaching and learning (Interviewee #15).

The SEED program enabled innovation in environmental education (EE) and EfS
through the application of the action research approach (ENSI, 2006). DGN’s programs
have been widely recognized as being effective in the process of linking research to
practice by engaging groups inclusive of researchers, teachers and policy makers as
reflective and deeply engaged program participants (Ferreira et al., 2009). The findings
support the author’s assertion that action research that singles out and directs attention to
the gap that exists between EfS research and its implementation in practice, is
fundamental to the success of EfS programs as they assist in facilitating participants’
progress from environmental and sustainability knowledge, to awareness or practice and,
potentially, to pro-sustainability behavior (Kollmuss & Agyeman, 2002).
Facilitating EfS programs through learning networks

While all four case studies exhibited traits consistent with learning networks, the Partnership and Participation for a Sustainable Future Tomorrow (SUPPORT-) program was specifically designed to facilitate in-depth communication and to harvest learnings through the application of a participatory and democratic approach that relied upon the broader structure of a Community of Practice (CoP). DGNs provided the structure for shared EfS research and practice by establishing themselves as a CoP (Duggan et al., 2015c) demonstrating the importance of the role ‘learning networks’ play in accounting for the ‘inherent complexities found within the delivery of EfS programs’ more generally (Interviewee #14). The SUPPORT program (Table 37) functioned as a learning network under the umbrella of the wider structure of ENSI’s CoP, successfully connecting participants and processes together through program delivery (Rauch, 2009). The network that transpired was structured to leverage and make use of technology to enhance a collaborative approach to program delivery and ‘…was distributed as a model of good practice’ where the development of community was facilitated ‘through the sharing of stories and experiences amongst members’ (Interviewee #17).

Table 37. SUPPORT program

<table>
<thead>
<tr>
<th>Program Description and Deliverables</th>
<th>Facilitating EfS through learning networks</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPORT is the ‘Partnership and Participation for a Sustainable Future Tomorrow’ program. SUPPORT linked schools, research institutions and communities together through the application of a web-based learning network set under the gradual development of a wider CoP. Deliverables included: Enhancement of sustainable development knowledge through network development and collaboration; and,</td>
<td>ENSI combined the more traditional conferencing/workshop model with online, communication technology to stimulate the development of a program learning network as a key component of the SUPPORT program. SUPPORT was delivered through partner meetings, conferences, workshops, and reports. These methods did not create the learning network in and of themselves. They aided in the transfer and creation of shared knowledge that is characteristic of what binds together both a learning network and the wider</td>
<td>Four booklets focused on biodiversity, collaboration and the use of ICT in the facilitation of EfS. Development of a web-based network. Co2nnect website used by 644 schools representing 31,815 students.</td>
</tr>
</tbody>
</table>
Fostering school-school and school-research collaboration via an online, web-based tool.

development of a CoP (Duggan et al., 2015c).

The principle outcome of the SUPPORT program was a highly organic and collaborative network which co-produced four research in practice outputs (i.e. booklets) exemplifying cooperative learnings. The intensity of collaboration that was facilitated between the program participants and the development of new skills, aptitudes and values, as noted by the program reviewer (Educational, Audiovisual and Culture Executive Agency, 2010) are evidence of the development of a strong learning network supporting the facilitation of EfS.

SUPPORT embodied learning networks that provided participants with the structure in which to collaborate and share cooperative learnings in a manner that was relevant to their specific needs and those of the program (Aineslahti, 2009). The SUPPORT program provided an example of the role a learning network plays in the process of enabling the facilitation of EfS. As indicated by a participant SUPPORT was:

…a kind of interface of teachers or principals who are highly engaged in their school programs with governmental people who are engaged in their national programs and with researchers who are trying to find out how can we improve environmental education programs… (Interviewee #9).

DGNs define themselves as ‘international networks combining different stakeholders’ (Interviewee #8). In addition, Schrittesser & Rauch (2003) suggest that EfS programs and the network through which they are implemented have to be formalized and developed to support a common learning and sense of identity for the learning community. The SUPPORT program accomplished this aim by providing participants the opportunity to develop program and self-identity through an approach premised on the idea that success for communities and networks increases if relevance and added value is captured and the attention and engagement of participants is maintained through shared program objectives (Wenger, McDermott, & Snyder, 2002). Learning Networks such as SUPPORT provide
explicit models for the formation of learning networks and CoPs, previously identified as important drivers of the Global Action Programme on ESD (GAP) implementation strategy. Precisely so when taking into account the requirement for an increased and expanded number of local level, learning networks involving a wider range of participants (Buckler & Creech, 2014; UNESCO, 2014).

**A decentralized approach to program delivery**

The Collaboration of Schools and Communities for Sustainable Development (CoDeS) program applied a decentralized approach involving geographically, organizationally and culturally dispersed participants. As indicated by a participant, this model of a decentralized approach was demonstrated by the engagement of multiple schools and teachers, whereby:

…ideas were amalgamated…and kept evolving over time. Other schools came to see what this school was doing. They would then go back to their own school and make their own priorities and their own curriculum (Interviewee #11).

CoDeS offered a platform whereby participants could engage and examine their experiences and the questions being asked of them regardless of physical location (Table 38). This technique involved a decentralized approach illustrated by the expansion of the programs geographically under cross-border Country agreements reaching throughout the European Union (ENSI, 2014b, 2015).

**Table 38. The CoDeS program**

<table>
<thead>
<tr>
<th>Program Description and Deliverables</th>
<th>Facilitating EfS through a decentralized approach to program delivery</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoDeS involved the development of a multilateral and decentralized network that focuses on school community collaboration for addressing EfS. The activities of the network aimed to provide a European perspective on the processes of learning, models, values and tools for successful collaboration.</td>
<td>A consortium of learning networks was formed through an adoption of the decentralized model already in evidence through the study of past ENSI programs. CoDeS brought together 29 organizations in 17 countries and represented one of ENSI’s most decentralized programs to Analyses of 46 exemplar cases of school-community collaboration.</td>
<td>Sets of indicators for collaborative projects. Toolbox to support project partners. Travelling guide for the reflective practitioner.</td>
</tr>
</tbody>
</table>
Deliverables included:

Employing qualitative research methods to the study of social learning theory;

Investigation of key aspects of collaborative structures involving diverse communities; and,

Identification of socio-cultural implications of collaborative and multi-disciplinary interaction.

date. These groups were assembled under the umbrella of ENSI's DGN and collaborated via ICT-based mediums.

CoDeS produced a collection of digital resources designed to improve the school-community collaboration in EfS and to assist in realizing a sustainable future.

Report on isolated communities and ways of integration.

Teacher training sessions.

ENSI acknowledged that coordinating the approach employed by the CoDeS program required the identification and utilization of existing networks for program delivery (ENSI, 2014b). To this end a wide range of partners were solicited and fashioned into program learning networks that were inclusive of school teachers, principals, educational institutes, teacher trainers, local communities and community members (ENSI, 2014a). Retaining the ongoing participation of participants throughout the CoDeS program was to prove a challenge. This became evident in researching the program’s progress report which referred to a significant reduction in face-to-face participation in planned activities as the program progressed (Network, 2013). These findings were also consistent with what had been observed in programs delivered by ENSI over the previous five years—that in all probability decentralization will need to be applied differently for future programs to succeed in retaining ongoing engagement by participants (Duggan et al., 2015c).

Connecting the regional nodes and learning networks, through which the CoDeS program was delivered, with the wider ENSI organizational strategy is a key dimension of the facilitation of EfS at the program level and addresses the research-practice gap identified previously (Duggan et al., 2015c). ENSI recognized that the broad engagement of teachers, students, governments and community participants on many levels was a ‘very good way of developing one strategy…to support many’ (Interviewee #13). A decentralized approach in delivering programs afforded the opportunity to work with multiple participants, while including subject matter experts and participant investigators (e.g. teachers) and simultaneously encouraging EfS to become embedded in legislation, policy, standards and practice (Buckler & Creech, 2014). These plans of action aligned
well with current international priority action taken to address sustainable solutions at the local and regional levels through EfS programs that utilize multi-stakeholder and decentralized networks (UNESCO, 2014).

Mainstreaming EfS Programs

In an initial attempt to mainstream EfS programs the Learnscapes Program resolved to promote the redesign of school grounds to permit school communities to interact with their environment, and to thereby link their curriculum to their use of those school grounds (Smith, 2004). Learnscapes were first launched through the application of this method in 23 Australian schools during the mid-to-late 1990s, originally as a trial program introduced by the New South Wales (NSW) Education Department (Smith, 2000). Learnscapes was subsequently adopted for delivery in Europe by ENSI in the 1998. Learnscapes Program Managers acknowledged that a significant challenge to facilitating EfS was in identifying how to spread the results of successful programs to new locations and in differing contexts (OECD, 1999). Offering a solution to this challenge Learnscapes applied the action research methodology as a way to help practitioners (e.g. teachers) to internalize the conditions under which they practiced (Kemmis, 2009); thereby, developing a knowledgebase that could be drawn upon when contextualizing and mainstreaming programs across geographical and cultural scales. As submitted by one participant:

…the most quoted verb of ENSI in the last five years, I'm almost sure it’s mainstreaming. So that’s a real challenge because we know how to launch a pilot school, how to have one school to have this aim of active learning and get insight into sustainability but I think the biggest question….is how to involve all the schools (Interviewee #8).

ENSI’s Learnscapes program (Table 39) was cited as an example of a program delivered across ENSI member countries and as demonstrative of mainstreaming EfS through program implementation across geographical regions (Smith, 2004).
Table 39. The Learnscapes program

<table>
<thead>
<tr>
<th>Program Description and Deliverables</th>
<th>Facilitating EfS by mainstreaming programs</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Learnscapes program utilized the school grounds as a physical location for teaching, learning and research. Learnscapes progressed through a number of phases with associated outcomes ensuring that the program proceeded in a logical manner, was able to be replicated, and was reflected upon regularly by participants throughout delivery. Deliverables included: Promoting the redesign of school grounds to permit school communities to interact with their environment; and Linking school curriculum to the physical school environment/grounds.</td>
<td>Learnscapes encouraged students, teachers and parents to work together to prepare a plan for how they would like to enhance the quality of their school grounds. Participants developed priorities aligned to redesigning the ‘learning space’ to permit children, teachers and their communities to interact with their environment, learn and reflect on the process. Learnscapes was delivered through a consistently applied program methodology (i.e. action research) regardless of the geographical location or diversity of the participants. ENSI's approach included teachers, teacher trainers, students, and researchers whose main focus is action research and development (Brody &amp; Hug, 2005). The program was delivered in both European and Australasian regions applying action research methods through contextualized content to suit regional conditions.</td>
<td>Development of a connection between the school grounds and the community. Sustainable land and building use curriculum LEARN (Learning Environments) extension program implemented post-Learnscapes.</td>
</tr>
</tbody>
</table>

Earlier research indicated that in Norway, Germany, Italy and Denmark the mainstreaming of EfS was considered one of the most effective aspects of ENSI’s Learnscapes program delivery (Smith, 2004). The Learnscapes program approach to mainstreaming EfS is also consistent with other models (e.g. preparing teachers for teaching EfS) which seek to engage participants more extensively in programs that bring about a reorientation towards sustainable practices (Ferreira et al., 2009). In addition, a significant observation gleaned from the Learnscapes program is that supporting EfS program acceptance into the mainstream meant programs could not be only about education for sustainability ... ‘It’s about student led change, student led action, and
growing leaders for the future. It’s about continuous improvement models in schools and renewable programs in schools…’ (Interviewee #12). This approach is consistent with what is referred to as a hybrid, collaborative action research process, exemplified by contextuality and reflective practice, and is advanced as a recommended model for mainstreaming EfS (Ferreira et al., 2009). In addition, this approach is in line with recent international action programs suggesting that mainstreaming Education for Sustainable Development (EfSD) in education through influencing policy and mobilizing as many participants as possible are significant ongoing priorities for sustainability more generally (UNESCO, 2014).

Formative and summative monitoring and evaluation of programs

The process of ongoing learning through program delivery was enabled by participants engaging in ‘reflective practice’—a process initially employed by ENSI as both an important aspect of program delivery and a necessary dimension of the action research methodology (Tilbury et al., 2004; Vallenga et al., 2009). One participant noted that:

All of our [ENSI] programs have been based on the need to train teachers and researchers to have a reflection on practice (Interviewee #4).

Supplemental to reflection, the CoDeS and SUPPORT programs enlist summative and funding-driven reporting requirements to ensure program managers and participants are accountable for program outcomes. Of necessity using these processes required participants to both reflect regularly and report often on program progress towards outcomes. Both formative (i.e. process) and summative (i.e. outcomes) monitoring and evaluation are key dimensions of DGNs monitoring and evaluation frameworks applied at the program level (Lupele, 2007). The CoDeS and SUPPORT programs provide examples of both the development of a ‘reflective practitioner’ (Interviewee #4), and a formal monitoring and evaluation process (Table 40).
Table 40. The CoDeS and SUPPORT programs

<table>
<thead>
<tr>
<th>Program Description and Deliverables</th>
<th>Facilitating EfS through monitoring, evaluation and reflective practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>The CoDeS program had a requirement set by external funders to complete regular progress reports as well as a statement of accounts identifying the expenditure of funds throughout the project.</td>
<td>ENSI embedded formal, summative monitoring and evaluation frameworks into both the CoDeS and SUPPORT programs. The summative evaluation process was a requirement of the funding agencies. ENSI was obliged to report on a quarterly basis against identified implementation and financial milestones. This ‘conditioned’ process lends itself to ensuring frameworks were in place as the programs commenced to monitor and evaluate ongoing program progress and outcomes.</td>
</tr>
<tr>
<td>The SUPPORT program included internal (e.g. AGM Report) and external (e.g. Third-party) evaluation to examine what initiatives were and were not achieving desired program outcomes.</td>
<td>In addition, the participants conducted formative evaluation through reflection on practice throughout the programs’ delivery as a component of the action research process. Ongoing learnings from reflections were applied to the further development and delivery of the programs cognizant of regional context. Data collection processes (i.e. participant surveys) were employed as an iterative process to capture learnings through the delivery of programs to inform the next phase of program delivery and/or research outputs.</td>
</tr>
</tbody>
</table>

The CoDeS and SUPPORT programs applied a multi-tier approach to program monitoring and evaluation through both formative and summative evaluation (Owen & Rogers, 1999). The formative process evaluated programs through the lens of participants’ reflections. This process afforded ENSI the ability to make ‘adjustments’ and ‘modifications’ to the programs and to ensure they were delivered contextually. It was also ENSI policy to engage participants in the process of reflective practice both during and after program delivery, thereby widening the perspective they were capturing. The process of reflective practice was instrumental in the development of personal accountability, encouraging recognition of specific and real outcomes that could be demonstrated for, and initiated by participants; and, stimulating the individual sense of responsibility and concern that accompanies this process (Mulgan, 2000).

Additionally, participants in time came to acknowledge the need for, and the importance of, embedding monitoring and evaluation frameworks in programs. Interviewees indicated that ‘[ENSI] spent a great deal of time discussing successful/unsuccessful stories and the factors that contributed to success or otherwise’
(Interviewee #17). By employing this strategy they developed the culture of a ‘learning organization’, ‘reflecting on successful and unsuccessful programs’ (Interviewee #4) both during and after delivery. Another interviewee reported that ENSI monitored what was ‘coming out [of] the outcomes…what does it mean, and what did we do…’ (Interviewee #10) on a regular basis.

The current course in program monitoring and evaluation is unlikely to change anytime soon given that EfS programs are scaled up through the delivery of UNESCO’s post-DESD GAP-ESD in which monitoring and evaluation is stressed as an integral component (UNESCO, 2014). The importance of reflective practice throughout both program delivery and formal monitoring and evaluation processes are emphasized, as is the pre-eminence of an organizational-wide framework for monitoring and evaluation that can be utilized to examine projects in relation to a DGNs broader organizational strategy as exemplified by UNESCO’s approach to the DESD (Tilbury, 2007, 2009).

5.3.2.4 Conclusion

The findings contribute knowledge on the effective delivery of EfS programs, and to the priority raised by the Global Action Programme on ESD (GAP-ESD), which questioned how organizations effectively facilitate EfS through the implementation of program level approaches that increase the capacity of teachers and participants to deliver effective EfS programs (UNESCO, 2014). DGNs facilitate EfS programs with the distinct purpose of addressing the expanding role of education in embedding sustainability in our society, a role they committed to in response to the increased recognition provided them throughout the UN-DESD years (UNESCO, 2014). Each of the five characteristics identified in this research can be taken to purposefully contribute to the facilitation of EfS, regardless of varied audiences and the diversity in the contexts or needs of the participants, which allows for a more general understanding of sustainability (McKeown & Hopkins, 2003). ENSI’s selective approaches to delivering programs demonstrates the significant influence a DGN can bring to bear when encouraging participants and governments of member countries to engage with EfS programs (Lupele, 2007). Specifically, ENSI utilized an action research approach to address the gap between research, policy, and school practice, therein providing the opportunity for programs to contribute to the effective facilitation of EfS more broadly (Smith, 2004). This approach was, in the participants own responses, considered of significant importance to the facilitation of EfS at the program level, enabling ENSI’s organizational and program level
objectives to be realized concurrently and through scaled program delivery (Duggan et al., 2013).

References


Publication Acknowledgement

The final, definitive version of this paper will be published in *Journal of Education for Sustainable Development, 2016* by Sage Publication India Pvt Ltd., All rights reserved.

Copyright © 2016 Centre for Environmental Education, Ahmedabad, Gujarat.
5.3.2.5 Section Discussion

The previous journal article has presented the findings of data collection and analysis as they relate to research question two. The findings demonstrate a connection between the organizational level and the facilitation of EfS at the program level. Specifically, the significance of EfS program approaches (i.e. action research) as a bond between the varying levels that characterize a decentralized organization and its impact upon the ability of an organization to scale its programs and, indeed, the organization itself. In addition, the author draws attention to three noteworthy sub-dimensions of ENSI’s program delivery which addressed the multi-dimensional characteristics of a DGN, namely: 1) addressing the requirements for context diversity; 2) addressing relevance at the values-culture scale; and, 3) utilizing reflective practice as a program facilitation tool.

A prevalent theme throughout the above two sections (i.e. Sections 5.3.1 and 5.3.2) has been the use of methodology to create a common language across the organization. This ‘language’ manifests itself within the scope the CoP and learning networks through the delivery of a common methodology. The findings presented in this chapter demonstrate the importance of utilizing a methodology that can be replicated across programs in order to ensure that it can be more easily contextualised and re-deployed. The subsequent section continues the analysis recognizing the patterns within the findings thus far through the identification of the challenges and opportunities DGNs face in facilitating EfS at both organizational and program scales.
5.3.3 Challenges and opportunities to facilitating effective Education for Sustainability: A synthesis of organizational and program dimensions

‘Challenges and Opportunities’ is the fourth empirically-derived journal article and addresses the third research question. This article examines the existence and the impact of challenges and opportunities upon the facilitation of effective EfS by a DGN at both the organizational and program levels. Discussion ranges around the complexity of the systems in which DGNs are operating, and the different spatial and temporal scales that come to bear on their organizational strategies and program delivery. It also postulates the varying outcomes these challenges and opportunities might have on the success of DGNs in facilitating effective EfS at various scales (organizational, geographical, and values/culture scales).

Author Contributions

Michael S. Duggan was the lead author to the publication titled Challenges and opportunities to facilitating effective Education for Sustainability: A synthesis of organizational and programme dimensions providing 90% of the content of this publication. Timothy F. Smith and Dana C. Thomsen provided 5% of the content each assisting in conceiving/designing the methods and contributing materials/tools to the process of analysis. Michael S. Duggan collected all of the data and conducted all of the analysis.

Michael Stewart Duggan Timothy F. Smith Dana C. Thomsen
Challenges and opportunities to facilitating effective Education for Sustainability: 
A synthesis of organizational and programme dimensions

MICHAEL S. DUGGAN, TIMOTHY F. SMITH and DANA C. THOMSEN

ABSTRACT

The facilitation of effective Education for Sustainability (EfS) programmes are made complex due to the multiple and diverse approaches employed by the organizations that deliver them, and the influence of different spatial and temporal scales. Further investigation of the organizational and programme dimensions impacting upon EfS facilitation is needed because there is little documented evidence addressing the inherent challenges and opportunities confronting its delivery. In this article the authors examine the organizational and programme characteristics of a Decentralized Global Network (DGN) in the facilitation of EfS, making reference to the application of a multi-scale, nested approach applied to the analysis. The findings show four challenges and five opportunities that impact upon a DGNs facilitation of effective EfS. These findings have relevance for EfS programme facilitation through global networks in general. They corroborate the theory that organizations who apply scalable approaches to EfS programme facilitation, coupled with approaches which are both contextual, relevant to participants, and confront the gap between the paradigms of research, policy and practice, are able to more readily address the inherent complexity of facilitating EfS. In addition, the findings contribute to an improved understanding of priority actions established through the Global Action Programme on Education for Sustainable Development (GAP-ESD), specifically the acceleration of sustainable solutions through the scale up of programmes and multi-stakeholder ESD networks.

Keywords: decentralized global networks, education for sustainability, multi-scale approach, scale-up, nested framework, challenges and opportunities

5.3.3.1 Introduction

The interrelationships between organizational and programme dimensions, and the different spatial and temporal scales at play within these systems, make understanding
the effective facilitation of Education for Sustainability (EfS) challenging (Norberg & Cumming, 2013). The United Nations Decade of Education for Sustainable Development (UN-DESD) provided the context in which to examine the facilitation of EfS across wide-ranging geographical and cultural scales and, explicitly through its reliance upon a global and decentralized base of organizations to deliver its objectives (UNESCO, 2007). To account for the multi-scale nature of EfS facilitation the authors have applied a nested approach with which to identify the challenges and opportunities to EfS facilitation simultaneously taken at numerous scales (McGinnis, 1999; Ostrom, 2012; Ostrom, 1999). Specifically, examining the analysis and application of administering appropriate strategy to the implementation of EfS programmes at both macro (i.e. global) and micro (i.e. local) scales.

The term ‘nested’ has generally referred to the singular spatial scale of governance; for example, nesting programmes within a progressive scale up from local to national delivery (Bors & Solomon, 2013; Ostrom, 2012). In contrast to this approach the authors apply a polycentric method to address scale, utilizing the comparative analysis of organizational and programme case studies to identify the challenges and opportunities confronting effective EfS facilitation by Decentralized Global Networks (DGNs) across multiple, nested scales inclusive of organizational (i.e. scale up), geographical (i.e. scale out) and values/culture-based (i.e. scale in) dimensions (Duggan et al., 2013). To investigate further the challenges and opportunities facing DGNs the authors draw upon previous analysis of five interpretive case studies characteristic of EfS facilitation by the Environment and Schools Initiative (ENSI) DGN (Duggan, Smith, & Thomsen, 2015b; Duggan et al., 2015c). The findings contribute to identifying the complex systems of interrelated dimensions at work within networks (Axelrod, Axelrod, & Cohen, 2000) and have relevance for understanding EfS programme facilitation through global networks more generally. In addition, these findings are pertinent to an improved understanding of EfS facilitation in the context of the United Nations Educational, Scientific, and Cultural Organization’s (UNESCO), and the Global Action Programme on Education for Sustainable Development (GAP-ESD) which identifies addressing networks and the challenges and opportunities to EfS facilitation as significant objectives (Buckler & Creech, 2014; UNESCO, 2014).
5.3.3.2 Methods

Five case studies (i.e. one organizational level and four programme level) including 8 key informant interviews, together with evaluation and interpretation of key documents and survey responses of ENSI members (n=13) generated detailed and contextualized data (Table 41) to analyze a DGN’s facilitation of EfS across eleven dimensions (Duggan et al., 2015b, 2015c).

Table 41. Organizational and programme dimensions characteristic of EfS facilitation

<table>
<thead>
<tr>
<th>Organizational Dimensions</th>
<th>Programme Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Developing a community of practice</td>
<td>1. Mainstreaming EfS programmes</td>
</tr>
<tr>
<td>2. Planning for phased organizational development</td>
<td>2. Facilitating EfS programmes through learning networks</td>
</tr>
<tr>
<td>3. Structured decentralization using a strategy-node-programme framework</td>
<td>3. Applying the action research approach to bridge the gap between research and practice</td>
</tr>
<tr>
<td>4. Linking research to practice</td>
<td>4. A decentralized approach to programme delivery</td>
</tr>
<tr>
<td>5. Ensuring relevance through contextualized approaches</td>
<td>5. Formative and summative monitoring and evaluation of programmes</td>
</tr>
<tr>
<td>6. Monitoring and evaluation of processes and outcomes</td>
<td></td>
</tr>
</tbody>
</table>

(Duggan et al., 2015b, 2015c)

Following this, the selected cases were analyzed through the theoretical lens of a multi-scale, nested framework (Figure 6), therein enabling the matching of patterns across cases and at varying scales (Duggan et al., 2013).
The authors’ took the learnings from the application of pattern matching and through analysis of the points of similarity and contrast identified the challenges and opportunities facing a DGNs effective facilitation of EfS.

5.3.3.3 Results and Discussion

Networks and partnerships with global reach and impact have an ongoing and significant part to play in supporting EfS facilitation at scale (Combes, 2005; UNESCO, 2014). UNESCO’s Final Report on the UN-DESD recognized that decentralized approaches to EfS programmes, coupled with facilitation methods which are both contextual and confront the gap between research and practice more readily address the inherent complexity of EfS facilitation (Buckler & Creech, 2014). However, there are challenges and opportunities inherent within EfS facilitation and, although the UN-DESD provided an opportunity for the varying elements of EfS to present a coordinated approach the challenge for facilitators now is to re-think the fundamentals of EfS, drawing up new paradigms for its future delivery (Wade, 2008).

With this challenge in mind the findings reveal four significant challenges and five germane opportunities relevant to the delivery of effective EfS across multiple scales. The challenges encompass: 1) funding for continuity of research and practice; 2) developing and applying a monitoring and evaluation framework; 3) policy alignment; and, 4) membership and participation. The opportunities comprise: 1) establishing a community of practice through learning networks; 2) valuing democratic process; 3) embracing
autonomy; 4) contextual relevance and avoiding the replica trap; and 5) translating research into practice. The authors postulate that the challenges and opportunities identified are not uncommon to other networks of similar stature, including those non-governmental organizations (NGO). An improved understanding of the challenges and opportunities identified may be instrumental in aiding a better understanding of how to engage participants in EfS, and in the wider development of transboundary EfS networks thought to assist in delivering effective EfS globally (Lenglet, 2014).

5.3.3.4 Challenges to DGNs facilitating effective EfS

Funding for continuity of research and practice

The programme growth prompted by the UN-DESD resulted in DGNs facing an increasing pool of organizations vying for EfS programme funding. This was at once both a positive signpost of the wider facilitation of EfS and a challenge to organizations that had been receiving funding from a smaller pool of applicants in the years prior to the UN-DESD. As indicated by one DGN participant, ‘the negative aspect is we are fighting for money…times are extremely hard…’ (Interviewee #6). Yet another participant responded that DGNs recognized that the question ‘how NGO’s (Non-governmental Organizations) such as DGNs survive in a time when there is no funding’ (Interviewee #10) was of significant interest to their participants as both an organizational and a research question. This observation was supported by the recognition of Teacher Education Institutions (Powell & Steinberg) that a lack of financial resources was a significant risk to EfS (McKeown, 2014). ENSI participants, for example, acknowledged that ‘without funding there may be no organizational capacity’ (Question 8, Respondent #1) in which to facilitate EfS programmes.

Coupled with the challenge presented by the need to obtain funding for EfS programme facilitation was the understanding that maintaining continuity of research and practice was also of critical importance (Table 4). A participant indicated ‘that [continuity] has been a weakness…so rethinking, reinventing themselves [ENSI] every three to four years is very important’ (Interviewee #15).
Table 42. Survey respondent perceptions’ of the most significant challenges for DGNs facilitating EfS

<table>
<thead>
<tr>
<th>Significant challenges</th>
<th>Rank*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtaining funding/income.</td>
<td>1*</td>
</tr>
<tr>
<td>Maintaining continuity of research and practice.</td>
<td>1*</td>
</tr>
<tr>
<td>Monitoring and evaluating outcomes.</td>
<td>3</td>
</tr>
<tr>
<td>Relevance to contemporary government policies and priorities.</td>
<td>4</td>
</tr>
<tr>
<td>Attracting new members.</td>
<td>5</td>
</tr>
<tr>
<td>Retaining existing members.</td>
<td>6</td>
</tr>
</tbody>
</table>

A ranking of 1 indicates the role considered most important and 6 least important.
*Options received a co-ranking as most important.

Continuity was important to DGNs from both an organizational sense (e.g. membership and funding), and also in their ability to maintain the unique role they held in making research-community-school connections through a focus upon aligning EfS research with policy and practice (Duggan et al., 2015c). The survey results support the challenges identified above. For example, statements such as ‘maintaining continuity of research and practice and obtaining funding are prerequisites…’ (Survey Question 5, Respondent #2) and represent the most significant challenges to DGNs.

In addition, respondents to the survey specified that not only was obtaining initial funding an important aspect of EfS facilitation but that the continuity of programme funding was of vital importance, greatly influencing a DGNs organizational capacity (Table 43).

Table 43. Survey respondents’ perceptions of the most important aspects of organizational capacity to EfS facilitation

<table>
<thead>
<tr>
<th>Aspects of organizational capacity</th>
<th>Rank*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity of funding over a period of time longer than the life of most major programmes (i.e. 5 years plus).</td>
<td>1</td>
</tr>
<tr>
<td>Accountability to key stakeholders including, but not limited to, programme funders, research participants, and organizational staff.</td>
<td>2</td>
</tr>
<tr>
<td>Monitoring and evaluation systems in place to evaluate meeting EfS facilitation goals and objectives.</td>
<td>3</td>
</tr>
<tr>
<td>Democratic organization whereby all members have a say.</td>
<td>4</td>
</tr>
</tbody>
</table>

* A ranking of 1 indicates the role considered most important and 4 least important.

For example, ENSI’s long-standing funding model relied primarily upon membership fees and/or umbrella organization funding in order to maintain financial viability and was
driven by its association with the Organization of Economic Co-operation and Development (OECD) (OECD, 1994). The funding strategy outlined above faced a major challenge when in 2009 ENSI was required to amend its organizational structure as a result of a change to their status as an OECD-supported organization. As indicated by one participant:

…it turned out that we [ENSI] had an aspect of being more sensitive to the market when not under such an umbrella (i.e. OECD). It was also a chance not only a challenge or obstacle. And now we are an NGO and we made this step as otherwise we couldn't apply for funding on the international level (Interviewee #6).

To address the challenges identified above ENSI focused upon the question of ‘why some programme initiatives are successful after the money has ended and some finished the day the money ends…why some survive and why some don't once the money has ended’ (Interviewee #10). ENSI recognized that obtaining both intial programme and ongoing funding would continue to challenge its continuity, and that traditional patterns of funding would need to undergo further planning as fewer organizations would be supported and programme impact would increasingly be scrutinized (Roob & Bradach, 2009).

For DGNs more generally, learnings from the study of ENSI have broad implications given that the findings clearly demostrate that the programmes which linked research to practice, seeking funding across researchers, business, and policy-makers by encouraging cooperation and exchange among participants (Diedrich, Upham, Levidow, & van den Hove, 2011) may see an increase in their effectiveness. This type of trans-disciplinary initiative demonstrates the growing importance of building networks through cross-sectoral approaches (Wade, 2008), and aligns with the recommendations made by UNESCO to make use of existing funding mechanisms available internationally (e.g. Global Partnership for Education), and to examine the options for new partnerships with multiple (e.g. private and public) sectors (UNESCO, 2014).

Developing and applying a monitoring and evaluation framework

The DGNs organizational case demonstrated participants recognition that progressively more funding was being directed towards evidence-based programmes that addressed both research and practice challenges, and that the funders of these programmes were increasingly requiring evidence of programme benefits (Massarsky & Gillespie,
For example, ENSI acknowledged that the benefits of monitoring and evaluation were more often being associated with a demonstration of the strengths and weaknesses of EfS programmes and their own response was to provide these findings as feedback to participants. The picture that emerges from the participants’ responses is that monitoring and evaluation is a valuable tool in determining strengths and weaknesses of EfS programmes (Table 44).

**Table 44.** Survey respondents’ perceptions of the benefits of DGNs monitoring and evaluating EfS programmes

<table>
<thead>
<tr>
<th>Benefits of monitoring and evaluation</th>
<th>Rank*</th>
</tr>
</thead>
<tbody>
<tr>
<td>To identify the strengths and weaknesses of programmes.</td>
<td>1</td>
</tr>
<tr>
<td>To enable ongoing learning and improvement to the practice of EfSD.</td>
<td>2</td>
</tr>
<tr>
<td>To provide feedback to key stakeholders (e.g. project participants, funders, academic community, etc.)</td>
<td>3</td>
</tr>
<tr>
<td>To identify the need for future projects and project areas.</td>
<td>4</td>
</tr>
<tr>
<td>To provide for the further development of the EfSD body of knowledge in general.</td>
<td>5</td>
</tr>
</tbody>
</table>

* A ranking of 1 indicates the role considered most important and 5 least important.

Most organizations have little evidence of their programmes efficiency and the results produced (Roob & Bradach, 2009). Notwithstanding the fact that application of monitoring and evaluation strategies for the facilitation of EfS was a significant area of contemporary research throughout the DESD years (Duggan et al., 2015c), and that it was a recurring theme that materialized numerous times during collection and analysis of research data. These findings were supported by UNESCO’s post-DESD ‘Roadmap’ which singled out monitoring and evaluation as being a core driver for the implementation of EfSD (UNESCO, 2014) and [still] a ‘considerable challenge’ to realizing the potential of EfSD in educational systems (Buckler & Creech, 2014).

Alongside the belief that the challenges of funding and continuity identified in the previous section are a major concern, DGN participants pointed out that monitoring and evaluating outcomes (refer Table 42) was one of the top three ‘most significant challenges to how effective the [EfS] programme is’ (Question 4, Respondent #3). As referenced above, the number of organizations now vying for a share of the same funding pool was increasing.
One DGN participant indicated that:

…because there are more networks, less resources you just really need to be more strategic. And have clarity of where you are headed and how you are going to go ahead and do other things and distinguish yourself from others (Interviewee #15).

ENSI gained ‘clarity’ through the redevelopment of their strategy to focus on monitoring and evaluation of programmes (ENSI, 2005). However, participant responses revealed there were significant challenges to delivering monitoring and evaluation frameworks. Initially, the countries that participated in ENSI’s wide-ranging (i.e. geographically) programmes were challenged by the scale at which they were required to evaluate and report, coupled with the conflicting demands of both ‘facilitating action research in schools and working in a more detached manner to evaluate the work of those same schools’ (Tilbury, 2011, p. 14). For example, programmes delivered at the international level were laden with complexity and presented significant challenges to monitoring and evaluation frameworks as was suggested by one key informant who indicated that ‘…it’s very hard to get data on an international basis’ as you often ‘…have different outcomes but on an individual country basis’ (Interviewee #12).

In addition, other key informants stressed the importance of ‘understanding what your strategy really is and is not, understanding what other networks are doing but [also] how they're going to do it differently and how to differentiate so that you're not overlapping, you're not competing for resources…’ (Interviewee #15). Implementing this type of strategy is made more difficult as a result of DGNs’ not having standard monitoring and evaluation frameworks in which numerous programme evaluations can be used to inform further organizational and programme development. Although somewhat limited in scope there were opportunities provided for critical reflection on an annual basis and the gathering of information about the delivery of programmes was provided through, for example, Annual General Meeting reports (Pfaffenwimmer & Smith, 2000).

Furthermore, ‘reporting to key stakeholders required that monitoring and evaluation occurs first’ (Question 8, Survey Respondent #1). For example, ENSI has in the past attempted ‘…bringing together different stakeholders who have to deal with curriculum, who have to deal with sustainable development or education for sustainable development, and have to deal with knowledge’ (Interviewee #9) using the expansive scope of their network to ask questions about the impact of their EfS facilitation. However, as expressed
by a key informant, organizations often have ‘a lot of systems like reporting systems and deadlines that you had to abide by and that becomes problematic as a lot of people felt like all they were ever doing was reporting and they weren't actually doing any real research’ (Interviewee #2). This response zeroes in on the importance of ensuring that a balance is struck between over and under-evaluating and reporting, given that this potential imbalance is felt by the participants to have direct consequences on the ability of a programme and its stakeholders to deliver upon the very outcomes that the programme is attempting to realize.

**Policy alignment**

An area of significant focus throughout the UN-DESD was accelerating change in policy for sustainable development at a level and scale required to address sustainability challenges (Meadows et al., 2004). This focus was supported by the determination that in order to remain viable EfS should progress along a trans-boundary path by more vigorously pursuing policy in research arenas (Lenglet, 2014). The emerging paradigm of policy, research, and practice was addressed by DGNs, for example an ENSI key informant stated that:

> The focus was on policy engagement and very much on framing innovation…particularly in the interface between theory and practice (Interviewee #15).

One of the most significant lessons learned from the UN-DESD now that it has concluded is ‘that strong political leadership is instrumental to advancing ESD’ (Buckler & Creech, 2014, p. 3). Regardless of this focus and accompanying learnings there were also significant challenges arising from DGNs strategic focus on policy. For example, ENSI was concentrated on research outcomes coupled with practical objectives as a core of programme delivery. Conflict arose when national authorities selectively converged upon these objectives themselves during the UN-DESD, and consequently, though inadvertently, became less supportive of ENSI’s work. Recognition of the ongoing work of ENSI was noted as decreasing as the DESD progressed (Interviewee #4).

ENSI’s practice of consistently framing policy influence as evidence of programme relevance exacerbated this challenge. For example, a consequence of adhering to this practice was that ENSI’s research agenda both influenced, and was influenced by, political and policy agendas. As reported by one key informant: ‘The main objective was
policy development inside countries…policy development which affects many schools’ (Interviewee #16). ENSI’s membership had traditionally been composed of participants representing OECD regions and/or nation-states (e.g. Australia, Austria, Italy and Germany) at a governmental level (Posch, 2001; Smith, 2004). They continued to focus on aligning their strategic direction with policy-makers in participating countries. For example, ‘from a research perspective, a lot of investigation produced was very governmental driven and I think people didn’t feel like it was very high quality research’ (Interviewee #1). The UN-DESD confronted this challenge and stimulated the policy conditions necessary to legitimize this type of educational research, evidence of which can be found in the promising inclusion of education and learning-related content in the draft Sustainable Development Goals (Lenglet, 2014).

Be that as it may in stimulating this ‘legitimization’ and as was intentioned, the UN-DESD generated conditions leading to the establishment of national coordination amongst those countries representing ENSI participants/members (i.e. governments). Current members were able to commence the development and management of their own EfS research programmes focused upon policy objectives (UNESCO, 2014). ENSI responded to this challenge by increasing the number of programmes that targeted policy objectives, and demonstrated stronger monitoring and evaluation programmes to strengthen the case for funding (Question 8, Survey Respondent # 8).

In effect, a focus upon environmental education (EE) and EfS at the policy level inadvertently corresponded with an increase in programmes delivered throughout the DESD (Buckler & Creech, 2014). For example, a key informant noted that:

…a lot of countries are changing their [educational] curriculum…to focus on what does this mean for environmental education in general (Interviewee #9).

The international reorientation towards EfS made it increasingly challenging for DGNs to facilitate EfS. However, the challenge of addressing political agendas, although initially problematic, could conversely be reflected as an opportunity for DGNs in the main given that a proactive approach may yield a position of leadership, whereby, organizations such as ENSI could become instrumental in, for example, the development of broad reaching international policy directions.
Membership and participation

DGNs ‘perform the kinds of functions typically identified with government—helping the disadvantaged, providing social services, supporting collective services such as museums and schools, preserving the environment, funding medical research, and the like’ (Weisbrod, 1997, p. 542). It is important to keep in mind then that ‘when government provides these services in forms and amounts that voters want, there will be little role for non-profits’ (Weisbrod, 1997, p. 542). The reduction in or lack of membership and participation posed a significant risk to DGNs. This risk was magnified by the above-mentioned focus of DGNs upon influencing policy, nor is it surprising then that the majority of the ENSI DGNs members were composed of country and governmental representation, both financially and operationally (Smith, 2004). One key informant noted that:

What ENSI can offer is a platform that researchers and governmental people can come together and think what might be interesting questions based on our experiences, what research can be done, and how can we encourage some universities, some governments to come together (Interviewee #9).

Encouragingly, ENSI recognized that ‘you can’t spread ENSI if you don’t spread (it’s) projects’ (Interviewee #4) and as more governmental members developed and delivered their own EfS programmes ENSI began to realize by the mid-2000’s that the type of participants who constituted their membership was beginning to shift and less of the governmental members were maintaining membership. As noted by one key informant:

…what I feel today is that ENSI has a decreasing potential view to less and less governments who really support ENSI and a loss of stability through the support by governments (Interviewee #9).

Whereas, it was predominately countries that were the members of DGNs and participated in its programmes ‘we [ENSI] have more and more universities that join or even individual parties but not these countries anymore’ (Interviewee #6).
This evolving participation/membership mix presented challenges for ENSI as noted by one key informant:

…from the structure of ENSI, continually you had to be a member of ENSI so a country had membership…basically the international network was country based so if you didn't have a formal connection they had some challenges…how can you join this club if you weren’t a representative of your country (Interviewee #3).

The challenge for DGNs was to expand the narrow focus of their membership to accommodate a wider audience of participants. In Australia, for example, the Australian Association for Environmental Education (AAEE) ‘appeared to take up membership of ENSI after the Government ceased membership … There will no longer be a government representative as it will be a teacher association representative [in Australia]’ (Interviewee #5).

In addition to new member types to replace governmental members ENSI addressed its widening ‘generation gap’ (Interviewee #6). ENSI had amassed a strong core group of researchers and coordinators who had been involved for many years. However, as noted by one key informant:

What is very sad that in some countries when the representative or the coordinator quits or goes to pension or just quit her or his job, at that time the country also leaves ENSI. So it happened with Sweden for instance that coordinator quit job and now Sweden is not on ENSI (Interviewee #6).

To address this challenge ENSI launched a Junior Researchers Programme in 2008 in fulfilment of one of the pillars of their Strategic Plan (ENSI, 2005). ENSI recognized that maintaining active researchers, future coordinators, and transitioning leadership had been at risk, and this contemporary programme was designed to actively attract and retain future ENSI leaders through research participation and engagement with the Organization. This programme has demonstrated some success with membership retention as evidenced by the junior researchers who attended a workshop held in Switzerland in 2008 and who have now transitioned to project leaders/researchers and country coordinators. This group of geographically dispersed participants successfully fostered continuing participation via an online community and connection around common research disciplines (i.e. environmental education and education for sustainability).
Additionally, it is recognized that one of the failures of ENSI’s decentralized approach is attributed in part to an absence of recognition of what might be meant by 'participation' and ‘support’ (Davies, 1999). The lack of recognition in this respect likely led to the cessation of some members’ involvement. Developing a clearer picture of what participation could and should look like and what it can offer programme participants, such as national governments, may well be instrumental in stabilizing the process of decentralizing programmes and maintaining active participation. For DGNs this means focusing not solely on geopolitical scale but on regional scale in order to attract and retain programme participants through a more regionalized model of decentralization that stresses independent engagement, reflection and critical thinking (Lauglo, 1995). This is a critically important observation for a DGN given that it represents the shifting dynamics of decentralization most evident in network membership. This recognition has impacts for how DGNs in general establish EfS programmes in the future to address the GAP-ESD focus upon utilizing networks to scale-up EfS (Buckler & Creech, 2014; UNESCO, 2014).

5.3.3.5 Opportunities for DGNs to facilitate effective EfS

Establishing a community of practice through learning networks

ENSI participants, and other organizations classified as DGNs (e.g. Foundation of Environmental Education, FEE) have identified that establishing a community of practice (CoP) was among the most important role of a DGNs in the process of facilitating EfS (Duggan et al., 2015c). As indicated by one survey respondent.

> Communities of practice and a sustained structure are the backbone of a decentralized network. They will hardly survive without it (Question 2, Survey Respondent 2).

The following figure illustrates the supposition that the ‘transmission of values, skills and learning’ through a CoP is supported by the broader strategy-node-programme framework (Figure 7) upon which DGNs are established (Duggan et al., 2015c).
The translation of organizational strategy to regional node, and ongoing to the programmes implementation, relied upon the development of learning networks grouped around specific programmes. This ‘convergence’ of organizational strategy and learning networks is where the interplay between organizational structure and the programme is best exemplified (Schrittesser & Rauch, 2003), and where the challenges associated with bridging the research-practice gap are most prominent (Colucci-Gray et al., 2006). As indicated by one survey respondent, ‘if the network is well-structured and well-run, there should be no problem (with programme delivery)…’ (Question 5, Survey Respondent #3).

Although DGNs have been delivering EfS through learning networks and CoP for some time their recognition of them as a means of aiding the facilitation of EfS, and as tools with which to scale up EfS programmes has only recently been documented (UNESCO, 2014). A survey respondent stated that a role of the DGNs should be to provide ‘mutual support and possible stabilization in international collaboration’ (Question 3, Survey Respondent #5). It is thought that through this ‘collaboration’ ‘…establishing a community of practice and creating networks facilitates taking ESD into the wider community (Question 2, Survey Respondent 11). The formation of a learning community presents an opportunity for both DGNs and participants in a network to develop a platform for engagement at the programme level (Duggan et al., 2015b). For example, ENSI’s programmes were considered by key informants to be effective ‘…because we were able to involve specific people working with us in research and who were considered good researchers, effective and useful’ (Interviewee #4). Establishing learning networks has enabled ENSI to be ‘…recognized as one of the few networks,
maybe the only one, who are really taking care of research in the practice of school education for sustainability’ (Interviewee #4), thereby allowing ENSI to distinguish itself from other networks. The relevance of this for DGNs is that fostering participation in research through learning networks and CoP that attract and retain programme participants should be a significant focus of their efforts at the periphery of their core EfS programmes.

One manner in which learning networks are facilitated is through the use of Information Communications Technology (ICT-) characterized by increasingly advanced communication methods and the development of online communities (ENSI, 2005). ICT was implemented by ENSI ‘to promote collaboration across the network’ (Survey Question 6, Survey Respondent #1). As noted by one key informant:

…we [ENSI] use the internet, ICT's to support many schools and then we don't want to help each school too much we want to give them the opportunity to develop themselves (Interviewee #13).

The focus on ICTs was likely influenced by the increasing accessibility to these technologies as the ICT industry expanded in the early 2000s; however, it was incorporated as a key strategy in the ENSI Strategic Plan (ENSI, 2005) after the UN-DESD emphasized ICT as one of its seven implementation strategies within the International Implementation Scheme (UNESCO, 2005b). The directive of the Scheme was to encourage participants to use ICTs to engage with their own organizations, their networks, and their alliances. ENSI has leveraged technologies to assist in the formation of a network for instance equipping their website as an online, virtual CoP for research and development focused upon the fields of EE and EfS (ENSI, 2004).

The focus on CoPs as a component of a DGNs Strategy was driven by the goal to address the needs of the UN-DESD and expand the networks organizationally and geographically, a direction that was re-enforced mid-UN-DESD (Tilbury & Mulà, 2009). ICT represents one such suggested means of addressing community scale collaboration (Wiske & Perkins, 2005). The findings detailed above are supported by research indicating that the use of ICT supports the dissemination of ideas and resources across a network in a strategic manner (Hopkins, 2012). More generally, using learning mediums to set up networks as platforms to exchange information were continuing to be investigated as priorities for the facilitation of effective EfS beyond the UN-DESD (UNESCO, 2014).
Valuing democratic process

DGNs characterize themselves as a learning organizations applying a flexible and dynamic structure of which the primary focus is introducing new educational and collaborative methods to the process of sustainability learning (Sleurs, 2008). DGNs encourage democratic participation amongst participants to address the impact of values and culture upon programmes by enabling a relationship of equivalence (Colucci-Gray et al., 2006). This approach necessitated taking into account the social process of knowledge formation by understanding how people come to have the ways of thinking, valuing and acting that they do (Glasser, 2007; Healey, 1997). Democratic approaches to delivering programmes that are culturally relevant, yet provide for and facilitate autonomy have demonstrated success in achieving relevant outcomes. Engagement and international exchange delivered through, for example, the action research methodology, assist this process (K. Henderson & Tilbury, 2004) by responding to programme challenges in substantive, meaningful and enduring ways.

ENSI acknowledged the importance of valuing democratic process and participation as key aspects of their network, and the significance of this strategy was substantiated by the UN-DESD Implementation Scheme indicating its congruence with international drivers of EfS facilitation (UNESCO, 2005b). There was acknowledgement that ‘the people are the strength of ENSI’ (Interviewee #6) and ENSI’s approach ‘brought people together from all sorts of organizations…they’ve had an inclusive nature’ (Interviewee #3). The ENSI DGN was viewed as ‘a very democratic network and we collaborate’ (Interviewee #6). This observation is reflected in ENSI’s core values which include fostering democratic decision making and evaluation as cornerstones of organizational and programme delivery (ENSI, 2005). In response both key informants and survey respondents recognized this value as being demonstrated when ‘their [participants] voices have been heard and their ideas has been taken into consideration…to focus on being in a participative process, a democratic process in the way of developing your own ideas (Interviewee #9). As reported by another respondent, ‘it’s all about people, so the relevance of the actual person in the network means everything’ (Question 14, Respondent #4).

Nonetheless, and as is demonstrated in Table 45, democracy’s perceived importance to organizational culture and values was ranked as the least important to the facilitation of EfS by survey respondents.
Table 45. Survey respondents’ perceptions of the most important aspects of culture/values to a DGNs facilitating EfS

<table>
<thead>
<tr>
<th>Importance to DGNs</th>
<th>Rank*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity and Relevance</td>
<td>1</td>
</tr>
<tr>
<td>Accountability</td>
<td>2</td>
</tr>
<tr>
<td>Monitoring and evaluation</td>
<td>3</td>
</tr>
<tr>
<td>Democracy</td>
<td>4</td>
</tr>
</tbody>
</table>

* A ranking of 1 indicates the role considered most important and 4 least important.

The results tabled above appear to be at odds with the importance placed on network democracy in some of the responses to the survey open ended questions. For example:

Some kind of democratic organization is a necessary prerequisite for a long term involvement of active members especially with respect to the definition of priorities (Question 8, Survey Respondent #2).

The disconnection between the participant responses in Table 45 as to the value of democracy in the culture-values paradigm align with the literatures indication that not unlike sustainability democracy has no agreed meaning (Huckle & Sterling, 1997). This is belied by the overall participant comments extolling the value of democracy and the democratic process in the facilitation of EfS by DGNs.

Embracing autonomy

The ENSI DGN grappled with the constructs of self-governance and autonomy throughout the first three phases of its delivery whilst financially and strategically tethered to its initiator, the OECD (Duggan et al., 2015c). The autonomy they had was related to the organizations independence to make its own decisions regarding, for instance, what other organizations they would invite to partner with them, how their network would operate, and what programmes they would undertake (Oliver, 1991). The OECD encouraged ENSI to develop a unique governance structure and ‘ENSI changed so dramatically in the three phases’ (Interviewee #15). However, ENSI never strayed far from recognition as an OECD-driven, coordinated and, by virtue of its relationship with OECD, funded programme (Kyburz-Graber & Robottom, 2006; OECD, 1999; Posch, 1990). This limitation on true autonomy represented both an opportunity and a challenge to the facilitation of effective EfS for two reasons. Primarily, ENSI delivered self-governance through application of non-hierarchical structures and the delivery of
contextualized strategy. Moreover, with the OECD significantly involved in programme oversight ENSI struggled with managing an organizational structure that encouraged ‘the ground up approach that fosters collaboration and autonomy across a network’ (Survey Question 1, Survey Respondent 1). Although ENSI was considered by key informants as ‘a very democratic network’ (Interviewee #6), the authors argue that in fact throughout this period it remained so strongly connected both organizationally and financially to the OECD that an increasingly top-down rather than bottom-up approach was inevitable.

Recognition of the issues of autonomy ENSI faced led to a second key aspect coming into focus. ENSI had been conditioned during its first three phases (i.e. 1986-2004) to rely upon funding resulting significantly from endorsement as an OECD aligned organization. Ultimately, when the OECD decided to provide ENSI with more autonomy by significantly reducing its involvement as an umbrella organization, ENSI struggled with how to re-define itself to maintain relevance to its stakeholders. As indicated by one key informant, ‘we [ENSI] were scared and feared that we can’t survive without such an important partner’ (Interviewee #6). This increase in autonomy was further exacerbated by a growing lack of recognition by members of the international community around the actual outcomes delivered by ENSI. This is supported by key informants who reported that:

The weaknesses are that we are a network that is now independent and recognition is not so high…in practice the possibility to actually have recognition is very small (Interviewee #4).

And;

I also feel it from other nations that ENSI is not seen and not received as important as I think so it should be received by the outside community (Interviewee #8).

DGNs would do well to consider that if they are going to remain autonomous and self-governing, without threat of becoming irrelevant, they will need to ensure a dependence upon any one organization for direction and/or funding is minimized from the outset. In addition, DGNs need to be vigilant that they do not invite autonomy so vigorously into their networks that the strategy in turn causes them to fade into obscurity. The previous findings suggest that the development of a community of practice can address this challenge. Where strong bonds are formed between the networks strategy, methodology, and outlining nodes/programmes, the opportunity presents itself for the creation of support systems embedded in the network, and accountability for organizational and
programme outcomes that support recognition well beyond the confines of the network (Duggan et al., 2015b).

**Contextual relevance and avoiding the replica trap**

The one-size fits all model is not appropriate to the facilitation of effective EfS as the value sets, nuances and contexts across both organizational and geographical scales are often different and a pedagogical strategy that is successful in one programme location may not be appropriate for another (Wiske & Perkins, 2005). DGN participants recognized that a significant challenge of programme facilitation was that ‘not all programmes work for all groups and all countries…’ (Interviewee #5). The authors contend that the success of a programmes delivery across a range of contexts requires the application of multi-scale approaches (Duggan et al., 2015c). However, programmes attempting to apply scale, without taking into account that effectiveness and ability to achieve certain outcomes are eroded by not varying programme design to suit differing contexts and values-systems and risk falling into a replica trap (Wiske & Perkins, 2005).

It is essential then to recognize for example, that adapting the programme to changing government policies and priorities in the different countries is difficult (Survey Question 3, Survey Respondent #3). For example, ENSI in recognizing these challenges to EfS facilitation implemented strategic and relevant questioning as part of their research approach, as a means by which to address the contextual requirements of programmes. By posing specific questions and framing programme delivery around these questions, ENSI was able to contextualize programmes, thereby focusing upon wide-ranging (i.e. government, education, sustainability) participants objectives. As noted by one key informant:

> The strategy of ENSI always laid in the specific questions which arise through environment education or later through how to deal with sustainability development. (Interviewee #9).

Recognition of the degree to which contextualization of a project will be driven by relevance to participants was noted by one key informant as important.

> No matter what you instigate at the centre every country will drive it within their own culture within their own abilities and with their own parameters, and will implement things differently have different outcomes but on an individual country basis (Interviewee #12).
In addition, ENSI recognized that ‘all organizations go through change and at any point in time your network is required to develop different capacities’ (Interviewee #12). Rejection of the ‘one size fits all model’ is essential. To avoid falling victim to a replica trap ENSI worked to ensure that programmes fuse structured and consistent methodology (e.g. action research) with variable methods of programme implementation (e.g. ICT-based), and at varying organizational, geographic, and culture-values scales. This includes ‘addressing the multiplicity of cultures and participants comprising a DGNs’ and the varied contextual needs of different people, perspectives and programmes (Duggan et al., 2015c).

**Translating research into practice**

Developing a ‘synergy between theoretical and practical experience through joint research and action’ (Interviewee #6), represents an opportunity for DGNs to facilitate effective EfS, and is a significant dimension of their programme delivery. A survey respondent suggested that:

> The biggest challenge of ESD is to transform ambitious theories into practice. There is a huge need to help practitioners to develop practices, theoretically well-established practices, which fit into reality of everyday educational practice at the same time (Survey Question 2, Survey Respondent #8).

Consistent with other DGN participants, one survey respondent acknowledged that ‘EfS, well designed and delivered, brings positive educational and wellbeing outcomes as well as local and global environmental and development outcomes’ (Question 5, Survey Respondent 10). The challenge then was to identify how to bridge the gap between the research and programme work done at, for example, the school and community level (Pfaffenwimmer & Smith, 2000).

Through the ‘midterm report on the UN-DESD we [ENSI] realised that there was no serious research done on school and community collaboration programmes’ (Interviewee #6) specifically examining quality criteria, or success factors of EfS facilitation. In response ENSI developed the SEED-Quality Criteria in ESD Programme with the specific purpose of examining the delivery of effective EfS including the dimensions that assist in continuity of research and practice (Breiting, Mayer, & Mogensen, 2005). ENSI identified the practice of ‘mainstreaming the transfer of knowledge into teacher’s daily
work’ as a requirement for translating research to practice (Smith, 2004, p. 15). For example, ‘in order to create good practices it is important to link knowledge with practice’ (Survey Questions 2, Survey Respondent 7). This ‘link’ becomes increasingly important when dealing with programme participants who espouse practical outcomes as key programme objectives (i.e. teachers). In the case of, for instance, facilitating EfS in schools and through teacher interactions it will be important to ‘…provide learning material and knowledge to the teachers, and have an organized and structured organization to manage environmental education (Survey Question 2, Survey Respondent 7). As ENSI has grown ‘the strategies have in one sense quite changed because now ENSI is an organization that is establishing large scale international projects on community and school relationships…’ (Interviewee #16). The ENSI DGN has presented a fine example of the cross fertilization of research and is also a good example of policy, practice and research (Interviewee #3).

However, the perceived lack of connection between research and practice stemming from scepticism regarding research relevance to practice and accessibility to practitioners in general is still pervasive (Kennedy, 1997). With this in mind, DGNs more generally would do well to focus their strategies upon the researcher-practitioner paradigm, the theory-practice relationship, and the reflective practice process, all of which are identified as key aspects of the research-practice relationship (Jarvis, 1999). The endorsement of this focus would aid in the synergy of theoretical notions and practical experience within programmes (Colucci-Gray et al., 2006). In support of these assertions it has been recognized recently that to convince people that EfS is a promising means of getting people to step onto a path towards a more sustainable future there needs to be a closer link between research and practice (Lenglet, 2014).

5.3.3.6 Conclusion

This article examined the challenges and opportunities for EfS facilitation. It was undertaken at a time when educational research was focusing on how scaling up impacts upon the facilitation of EfS from a uni-dimensional perspective examining scale as predominantly an expansionary construct (i.e. geographic), for example, the number of schools that could be reached by a certain programme (Coburn, 2003). The findings presented in this article substantiate significant challenges and opportunities to the extensive partnerships and networks DGNs comprise and expand upon the authors earlier analysis concerning organizational and programme level facilitation of EfS (Duggan et
The findings support the growing impetus to link together research, government, education, and community sectors, all influential factors in the facilitation of EfS throughout the UN-DESD (Buckler & Creech, 2014). The research has intentionally broadened the more commonly accepted definition of scale through close examination of the interrelationships surrounding the dimensions that characterize DGNs with the application of a multi-scale approach involving the nesting of multiple (i.e. organizational, geographical and culture-values) scales within a framework of analysis (Duggan et al., 2013) and using this analysis to illustrate challenges and opportunities for EfS facilitation. The findings throughout are relevant to an improved understanding of EfS facilitation in the context of UNESCO’s GAP-ESD. Specifically, the acknowledgement that greater decentralization of EfS efforts and programmes characterized by an approach focused upon the up-scaling of networks and programmes increased the likelihood that EfS initiatives and curricula were to be adopted (Buckler & Creech, 2014).

References


Publication Acknowledgement

The final, definitive version of this paper will be published in *Journal of Education for Sustainable Development*, 2016 by Sage Publication India Pvt Ltd., All rights reserved.

Copyright © 2016 Centre for Environmental Education, Ahmedabad, Gujarat.
5.3.3.7 Section Discussion

The ENSI DGN and program cases identify that values, intentions, knowledge and commitment in support of sustainability all impact upon facilitation and, do not, in and of themselves, lead to meaningful behavioural change towards sustainable development (Glasser, 2007). In essence what a DGN’s approach offers participants is ‘this kind of feedback or reflection form through research collaborations and innovative questions’ (Interviewee #9). Thereby, acknowledging diversity and differing organizational, geographical value scales through which programs are developed and delivered.

Challenges are pervasive and often attributable to any number of geo-political factors outside the control of a networks sphere of influence. For example, the impact of a reducing pool of funding will continue to impinge heavily upon an organizations ability to maintain continuity of practice and program outcomes expected of program stakeholders. As demonstrated, the nexus between theory and practice offers an opportunity for networks to strengthen their CoPs and tender their organizations as viable and valuable avenues to which current and prospective members will direct their resources. The majority of DGN participants as evidenced by ENSI were in general agreement regarding the importance of the following observations: 1) delivery of programs that assist in the mainstreaming of program outcomes; 2) the structure that CoPs and learning networks provide for programs at local, national and international scales; and 3) the realization of these first and second observations through the translation of theory into practice. It was identified that through a focus upon closing the gap between theory and practice DGNs appear to best ensure that challenges to, and opportunities for, the facilitation of EfS are most effectively addressed.
5.4 Chapter Five Conclusion

An examination of ENSI DGN, and programs provisioned by them, presented in the three sections provide comprehensive case studies with which to examine the facilitation of EfS. The DGN’s organizational governance and program delivery, although effective in many ways, has been less effective in other areas as demonstrated in the findings. Research findings from organizational and program cases illustrate the characteristics through which EfS is facilitated by a DGN and the ongoing challenges and valuable opportunities they face in the provision of EfS programs. A few of the key take-away learnings gleaned from this research are offered as follows:

Firstly, a structured yet malleable approach is seen as significant to a DGN’s ability to contextualize the delivery of its programs to meet participants needs and to address shifting regional drivers or new ‘questions’ that emerge.

Secondly, DGN program approaches should not be so rigidly established that they cannot be adjusted to adapt to changing global, national, or regional priorities across multiple scales. This approach can be demonstrated by the adaptability of DGNs programs to addressing those drivers or outcomes most relevant to participants and characterized by an understanding that ‘not everything would be relevant to every participant at the same time’ (Interviewee #5). Bringing participants from varied disciplines together to build collaborative bridges between sustainability issues was conducive to program replicability and adaptability to unique contexts (Stewart, 2010).

Thirdly, DGN participants (e.g. program managers) reflected on previous practice thereby absorbing learnings from former program delivery. The practice of reflection assisted participants to develop an appreciation of different cultures and a comprehension of how program methodology could be contextualized for delivery in differing regions or to different cohorts. For example, ‘depending on which region or political system you are looking at, we [ENSI] have several types [of approaches]’ (Interviewee #6) that support programs that ‘mainstream EE and EfS into educational curricula’ (ENSI, 2005). These approaches aligned with already established and accepted dimensions of delivering mainstreamed programs in education systems more generally and at multiple levels including policy, school, and research (OECD, 1999).

Finally, monitoring and evaluation processes appear to be applied at the program level more rigorously than at the organizational level. However, the ENSI DGN disclosed that they evaluate each program they facilitate on a case-by-case basis but that they do not
monitor and evaluate facilitation of EfS programs in an integrative and holistic manner across the organizational. By evaluating on an ad hoc, case-by-case basis, and without a formal organizational-wide strategy and method for integrating outcomes as organizational drivers, ENSI does not gain a complete picture for the performance of its EfS facilitation efforts. For example, although interviewees clearly indicated that identifying the strengths and weaknesses of a program through evaluation was important to DGN programs, in fact it can also be noted that the actual practice of monitoring and evaluation was not regarded by survey respondents as of great importance to program delivery (Duggan et al., 2015c). One participant indicated that the time taken to monitor and evaluate programs was disproportionate to the time spent on providing the program (Interviewee #17). And, another key informant responded that ‘ENSI certainly evaluates itself often but it doesn't stand back and look at what else it could be doing…’ (Interviewee #15). Conclusively, a lack of structured monitoring and evaluation (M&E) is not consistent with ongoing global action designed to address the values and behaviour required to bring about a sustainable future (UNESCO, 2014). However, the analysis here of the M&E frameworks, or lack thereof, that DGNs do apply (e.g. reflective practice and funding reports) contributes to the current expanding pool of indicators and M&E literature published in the years prior to and during the UN-DESD - E.g. (Boswell, 1995; Bartelmus, 1997, 2008; Bellamy, Smith, Taylor, & Walker, 2004; Fricker, 1998; Margoluis & Salafsky, 1998; Stem et al., 2005; Tilbury, 2007, 2009; Tilbury & Mulà, 2009; Woodhill, 2000). The discussion in Chapter six builds on this line of inquiry, wherein, the author asserts that there is much to be gained by opening up additional streams of research examining the application of a multi-scale framework for organizational and program indicator set and M&E purposes. The theoretical significance of which will be outlined in further detail in Chapter six.
Chapter 6: Conclusions
Chapter 6. Conclusions

6.1 Introduction

One significant aim of this research is to address the lack of knowledge about the role that networks (i.e. DGNs) play in addressing sustainability challenges. This aim aligns to growing recognition amongst local, national and international levels of government that decentralized networks will increasingly direct the pace and change of approaches and responses to these challenges globally (Buckler & Creech, 2014; Suter, 2003; Weyler, 2004). When designing this study the author took note of the literature indicating that the policies, systems and organizational frameworks required to address ‘sustainability challenges’ were not demonstrating sufficient evidence of application at the requisite scales to adequately respond (Meadows et al., 2004; Sterling, 1992b). This research recognizes these observations and sets out to examine the research gaps to offer a unique contribution to knowledge within the EfS field of study through the development of a theoretical framework and analysis of case studies that identify decentralised network approaches to the facilitation of EfS.

The research commenced with an exploration of the literature examining EE, EfSD and EfS more broadly, and a discussion of ethics and worldviews that shape people’s understanding and application of these core concepts. The author concurs with the literature that key functions of education in, out and for the environment (and later sustainability) are shaped by these human, psychosocial constructs, and that experiences of sustainability and education fall within an ethical and values-centric framework (Smith et al., 2010; Sterling, 1993). However, given the growing complexity and challenges of contextualization (e.g. differing community capacities, resources, political commitment, and sustainability challenges) that accompany education and sustainability programs—coupled with a gradual expansion of their facilitation at local, national and international scales—has meant both articulating and connecting these concepts within a common framework has continued to remain elusive (Brown et al., 1987; Dryzek, 1997; Wade, 2008). The embedding of these constructs within any single frame of reference is further complicated by the dynamic economic, social, environmental and governance dimensions influencing the world in which we live, and consequentially the heightening global-scale awareness of sustainability challenges and opportunities that stimulate interdisciplinary and international approaches to these constructs (Combes, 2005; McKeown & Hopkins, 2005; Smith et al., 2010). Conceptualization of the multi-dimensionality of this evolving
landscape necessitates an equally multi-dimensional and systemic response that appreciates the non-linear nature of interactions amongst multiple sustainability constructs. The approach advocated in this research is integrative, systemic and process-oriented addressing the dynamism inherent amongst the dimensions embodying EfS (Hopkins, 2014; Kates et al., 2000; Mog, 2004; Tàbara & Pahl-Wostl, 2007; Ison, et al., 2007; Ison et al., 2011).

The research findings have demonstrated that a global networks’ facilitation of EfS at both an organizational and program level requires multi-dimensional approaches and that the majority of networks apply these dimensions across varied scales. This study has expanded upon the current literature through the application of a theoretical framework that is multi-dimensional and nested. This framework incorporates the less cited culture-value scale (i.e. scale in) in conjunction with the more commonly researched and written about dimensions of geographical (i.e. scale out) and organizational (i.e. scale up). The author’s belief is that the framework proposed in this study is applicable to EfS and, indeed, education more broadly. This is discussed in further detail in subsequent sections of this Chapter. Table 46 provides an overview of the Chapter’s structure.

**Table 46. Conclusion Chapter structure**

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 6.1</td>
<td>Reintroduce the research context, problem and theoretical frame; and, provide an overview of the Chapter.</td>
</tr>
<tr>
<td>Section 6.2</td>
<td>Reiterate the purpose of the study including briefly discussing the rationale for the conceptual framework as it relates to the research questions and approach applied.</td>
</tr>
<tr>
<td>Section 6.3</td>
<td>Identifying the significant and original contribution to the body of knowledge by addressing the aforementioned critical knowledge gaps.</td>
</tr>
</tbody>
</table>
| Sections 6.4 and 6.5 | Summarize the implications of the research findings including:  
• Implication of the findings for the facilitation of EfS and approach to partner networks more broadly;  
• Presenting the implications for future research; and,  
• Identifying the implications of the theoretical framework. |
| Section 6.6  | Provide a reflection on the research process itself and identify limitations of the study.                                                    |
| Section 6.7  | Present final concluding remarks.                                                                                                            |
The UN-DESD has stimulated an increase in research and published literature on the topic of EfS, specifically on its implementation. The UN-DESD was focused on mainstreaming EfS and this research makes a contribution to the understanding of this objective as a by-product of the study’s more specific contributions to knowledge. Broadly, this research was driven by the literature supporting education for sustainability as a means to create awareness and participation in sustainability actions and development more generally (Buckler & Creech, 2014; Tilbury, 2007). The conclusion of the UN-DESD in late-2014 provided further support of the potential societal benefits of this study through the implementation of the GAP-ESD, an initiative that encouraged advancement of the aims of the UN-DESD through organizational and program-level EfS facilitation, and the further identification of networks as significant contributors to EfS facilitation internationally (Buckler & Creech, 2014; UNESCO, 2014). The theoretical framework presented by the author offers a multi-dimensional approach intended to broaden UNESCO’s post-UN-DESD focus on scaling up ESD action through reorienting education and learning towards sustainable development and accelerating sustainable solutions through networks and decentralization (Buckler & Creech, 2014; Taylor, 2014; UNESCO, 2014). In addition, the author offers indications of potential future areas of research to address, for example, what UNESCO refers to as ‘unfinished business’ from the UN-DESD (UNESCO, 2014, p.34). These potential research areas are framed by the continuing emphasis upon EfS encouraged by UNESCO’s global priorities identified at the World Education Forum in May 2015 (Breiting & Mayer, 2015) and in the emerging Sustainable Development Goals (SDGs), which include action-oriented and lifelong learning, quality education and multi-stakeholder partnerships as key aims.

6.2 Purpose of the Study

The study commenced in 2008 when the UN-DESD was still in the first half of a 10 year delivery program. As indicated previously, this period was characterized by research specific to the UN-DESD being published such as the preliminary Monitoring and Evaluation (M&E) frameworks for understanding systems, processes and outcomes (see for example, Mula & Tilbury, 2009; Tilbury, 2007; Tilbury & Janousek, 2006; Wals, 2009). A number of UN-DESD objectives also focused upon identifying strategies that could lead to an improvement of the conditions in which regions and countries could facilitate EfS (Wals, 2009). In addition to understanding how to monitor and evaluate program facilitation, yet another of the UN-DESD goals was to identify the significance
of and to facilitate broad networks and linkages for EfS (Wals, 2014). An initial review of pertinent literature in 2008 confirmed for the author that there was limited research examining the dimensions characteristic of global networks (e.g. DGNs) facilitating EfS and the scales necessary for effective facilitation to occur. In recognition of this the study was devised to contribute to an understanding of the dimensions underlying effective EfS facilitation at organizational and program levels. From a research perspective centred on efficient and effective EfS program delivery, and the application of the theoretical framework of scalability the following research questions were posed:

1. How does a Decentralized Global Network facilitate EfS at a macro (i.e. organizational) level?
2. How does a Decentralized Global Network facilitate and implement EfS at a micro (i.e. program) level?
3. What are the challenges and opportunities facing a Decentralized Global Network in the facilitation of effective EfS?

The research questions were examined through the lens of the global, multi-scale theoretical framework identified in detail Chapter three. The interpretive and constructive analysis of the ENSI organizational case study and comparative analysis of four program case studies have provided findings that address these research questions. A number of the most prominent will be alluded to and discussed in subsequent sections.

6.3 Knowledge contributions

This research has presented a reconceptualization of scale from its common association with quantitative terms or scaling up (Coburn, 2003) to a broader notion of the concept as a multi-scale, nested approach, specifically, accounting for the cultural-values scale as well as the more traditional concepts of scaling-up at organizational and program levels. The globalized, multi-scale framework adopted for this thesis advises a nested approach be applied to the analysis of the facilitation of EfS that assumes more than one dimension of scale needs to be addressed in confronting complex sustainability concepts such as contextuality and mainstreaming. For example, current focus and understanding is very much centred on the relative and spatial concept of scale inclusive of scaling up geographically (i.e. reach), quantitatively (i.e. number of participants/programs) and organizationally (i.e. governance). The emerging approach presented is inclusive of scaling in (i.e. culture-values) and this approach to scale
recognizes EfS as a multi-dimensional, evolving concept involving systems, process and people.

In addition, application of the theoretical framework points to multi-dimensional lessons that may be applied more generally in the educational and management sectors. For example, in the field of higher education, scholars have called for a wide-ranging incorporation of sustainability education into the curricula of universities (Stewart, 2010). This includes, approaches that take into account the cultural nuances of the student and academic populations, the organizational necessities of academics in developing sustainability-oriented curricula, and the logistical requirements of ensuring that learning outcomes demonstrate knowledge and understanding of sustainability issues and concepts. As is discussed in the following section, scaling in, and back out, throughout the facilitation of EfS may eventually assist in translating these lessons from the educational sector into practice, which would be well suited to addressing the multi-dimensionality of scaling sustainability learning more broadly.

The study’s findings also have implications for future research with relevance to the post- UN-DESD agenda which seeks to continue to identify the means through which to initiate and scale up sustainable development actions at local and global scales beyond the education sector (Taylor, 2014; UNESCO, 2014; Wals, 2009). More broadly, business have taken notice of the impact that scaling sustainability learning and actions have upon their commercial objectives, particularly in light of the recent Conference of Parties (COP21) agreement in Paris. Commercial signatories to the UN Global Compact and support for the COP21 agreement have demonstrated that business are a driver of scale beyond traditional growth in commerce. The recognition of culture and values (i.e. scaling in) has come to the fore as a crucial component of the business impact upon sustainable development, the understanding of implications of which are only in their infancy. In conclusion, this theoretical framework is applicable outside of the education sector, particularly considering the focus of EfS initiatives upon multiple levels of society inclusive of commercial and entrepreneurial sectors, and the recognition by leaders that EfS is a key facilitator of principles agreed to under the UN Global Compact including the focus upon promoting greater environmental responsibility through business (Buckler & Creech, 2014; UN GlobalCompact, 2007).
6.4 Implications for the facilitation of EfS

The findings of this research have broader relevance to the field of EfS through provision of knowledge to improve approaches to sustainability learning at multiple organizational and program scales (i.e. multi-dimensional approaches). A more expansive understanding of the process networks engage in to scale sustainability learning has been identified and, regardless of the facilitator (e.g. government, NGO, private company) or organizational structure of the facilitating agent (e.g. decentralized, centralized, distributive), this research has provided greater knowledge upon which to improve these processes.

In addition, the research provides improved understanding of the function of Communities of Practice (CoP) within EfS networks. The author identifies that CoPs provide a framework for multi-scale approaches and the development of networked partnerships. CoPs are recognized as integral to EfS facilitation and are emphasized as one of four main strategies in the GAP-ESD (UNESCO, 2014). UNESCO’s model for delivery of the GAP-ESD is recognizably modelled upon the formation of CoPs through a decentralized approach to network development and program implementation.

Networks, for example, develop strategies that enable their continued facilitation of EfS over significant timescales, across extensive geographical divides and at policy, research and practice levels. These strategies are not limited to DGNs or even sustainability organizations in general and are inclusive of linking research to practice and policy through the application of varied mediums for program delivery methodology (e.g. action research) and participant engagement (e.g. ICT). The policy-research-practice approach when utilized by networks has been put forward as a means to solve one of the most critical challenges sustainability faces—how to adapt theory into the reality of everyday life. Linking research to practice and policy provides the opportunity of a practical purpose for the research transcending theoretical aims. In this manner, research is able to shape and contribute to policy development thereby substantiating its practicality and making provision for a broader impact. However, it should be noted that this process carries a risk of its own given that alignment with specific policy directive can be a fickle approach as, for example, a change in the national government or a shift in international policy may precipitate the theoretical contribution being ignored or discounted entirely. Further research into the policy-research practice paradigm itself may present an opportunity for future study.
At a program level, the findings corroborated that facilitators of EfS need to take into account the impact of disparate worldviews, value sets and ethical persuasions when developing and attempting to mainstream programs. Allowing for programs to address contextually-specific understandings of sustainability and sustainable development so that they are adaptable and encourage relevance for the audience in which they are intended is of significant importance (Coburn, 2003). This is an aspect of the values-cultural scale which should be addressed both during the program development stage and again upon reflection if the program is to be delivered under different conditions, as for example, to a different cohort or in a different country. DGNs, for instance, address contextuality through their research approach (e.g. action research). This approach has implications for organizations who follow a strictly outcome-driven (i.e. linear) approach to sustainability learning. Inevitably, they fail to meet the requirement that the process should encompass the provision of sustainability skills, values, knowledge and attitudes, by embracing expansive programs and facilitation methods within a defined scope of context considered relevant to the audience in which the program is being facilitated. As identified in the literature review (see for example; Fien, 1993b; Huckle, 1993; Sterling, 1992b; Tilbury, 1995) the recommended approach is non-linear consisting of re-conceptualizations and changes amongst knowledge, skills and behaviours. If a linear approach to scaling EfS facilitation is adopted it can lead to replication (Wiske & Perkins, 2005), which is identified in this research as not conducive to facilitating effective EfS.

Finally, the UN-DESD is an important contributor to the context in which this research has taken place and it is relevant to note that the UN-DESD had a serious, though unintentional impact upon the ENSI network and its organizational and program strategies. This is a point worth noting for EfS facilitation more generally as it stresses the need for organizations to stay alert to the unintended consequences of efforts to decentralize and the possibility of a downside to the generation of networked partnerships. As this study has shown the impact of the UN-DESD was not entirely positive and included a lessening relevance of the ENSI DGN as a result of countries taking EfS facilitation on themselves to deliver research and practice, which resulted in a shift in the centre of power from ENSI to nation-states (i.e. centralization). ENSI was gradually forced to assume a new strategic direction as countries ceased membership and, in 2005, began moving away from a solely action research approach towards participatory research through large-scale, evidence-oriented projects, teacher education and the production of EfS resources grounded in research findings and analysis. The focus was
to ensure ENSI ‘could work effectively in the framework of the UN-DESD…” (ENSI, 2005:7), and to attempt to incorporate the seven UN-DESD implementation strategies. Both the objectives and outcomes of later ENSI programs were aligned strongly with the UN-DESD strategies focusing, for example, upon the development of quality criteria for ESD schools and teachers, and the resultant training courses and resources which align with the UN-DESD implementation strategy four, capacity-building and training. However, regardless of the ENSI DGNs attempts to align with the UN-DESD, the relevance of the network retreated as governments took it upon themselves to drive EfS programs. Lessons learned from the past regarding adaptability and relevance are today being investigated by the network as, yet again, it is set to rebuild itself for what will in all probability be a fifth wave in its development or, equally possible, its retirement.

6.4.1 Partner Networks

The post-DESD Global Action Programme on ESD (GAP-ESD) commenced in 2014 and a significant emphasis of this programme is the continued development of wide-scale, multi-partnership approaches to EfS facilitation (Buckler & Creech, 2014). The GAP-ESD intends to accomplish this aim through the establishment of five Partner Networks, each representing a Priority Action Area identified in GAP-ESD. GAP partner networks are considered central to the implementation of the post-DESD agenda tasked with discussing and elaborating on an initial workplan including: identifying key implementation milestones; defining within each Network their responsibilities, coordination and working methods; and, generating synergistic conditions for the activities of their members catalysing actions by and for other stakeholders (UNESCO, 2015). The development of these new Networks are progressing and in May 2015 a meeting to formally establish five Partner Networks was held in Paris, France. Representatives from government, academia, business and civil society were in attendance. The international reach of these decentralized networks is expanding and their spread has been mapped by UNESCO through the submission of voluntary EfS Progress Reports (UNESCO, 2015). The commitments of network stakeholders to the post- UN-DESD GAP are regularly updated and available online at: http://www.unesco.org/new/en/unesco-world-conference-on-esd-2014/esd-after-2014/global-action-programme/launching/.

The findings of this study have implications for how these partner networks are arranged and structured through the UNESCO GAP-ESD. Future research, which will be
examined further in subsequent sections, could utilize the dimensions identified as characteristic of networks facilitating EfS to inform the development of networks. The GAP-ESD sets out the development of global, regional and sub-regional networks managed and coordinated at a global level by a central body (UNESCO, 2014). This approach is characteristic of a decentralized network which may benefit from being implemented in line with the structured approach taken by DGNs to implement strategy-node-program frameworks. As demonstrated, by the program case studies this structure makes use of existing networks and the rationalization of current resources (e.g. members). The case studies have demonstrated that engaging existing networks in the facilitation of programs is both resource and cost effective. As UNESCO has indicated that their ‘Chairs’ already coordinate various networks at national and international levels (Wals, 2014) the application of the strategy-node-program dimension of a DGN’s organizational approach to facilitating EfS identified in this research may prove an appropriate methodology in which to address UNESCO’s sustained objective to decentralise and scale up EfS through networks. Future research might well be oriented towards a study of how these networks are developed and could make use of the monitoring and evaluation (M&E) framework endorsed in the upcoming section (i.e. Section 6.5.1.1) to evaluate progress as the GAP-ESD evolves.

6.5 Implications for Future Research

The developing understanding of a DGNs facilitation of EfS at the organizational and program levels addresses a number of UNESCO’s founding and GAP-ESD priorities, including the focus upon accelerating the scale-up of education as a path to sustainable development (Buckler & Creech, 2014). As the international community progresses from a period of global focus on identifying and stimulating approaches to the facilitation of EfS to a period of enabling people and governments to mobilize responses to sustainability opportunities and challenges, connecting sustainability theory to contextually relevant practices through learning processes presents a response worthy of future research (Taylor, 2014). Research to address and improve understanding of these ‘processes’ is likely to include further examination of M&E frameworks, multiscale approaches, and investigating application of theoretical frameworks developed in this study to other sectors and contribution to knowledge more broadly. The implications for future research identified below provides direction on where the field is trending in the context of the emerging international drivers.
6.5.1 Monitoring and Evaluation Framework for DGNs Facilitating EfS

The present lack of mechanisms designed for harvesting and monitoring data from EfS programs, and the failure to offer a congruent approach to solving challenges, enfeebles the capacity of networks to meet their core objectives (i.e. effective EfS facilitation). Ensuring congruence within and amongst levels of monitoring and evaluation is important to modern governance structures which consist of co-arranged and collaborative approaches (e.g. programs) to problem solving (Kooiman, 1993). The failure to present a definitive end result in organizational and program outcomes has widespread implications from, for example, both operational and funding perspectives. To date only fledgling and developing, yet still limited mechanisms, exist for integrative monitoring and evaluation of EfS facilitation designed to examine contexts, process and outcomes from a ‘whole of system’ approach. Suffice to say, an examination of this research limitation represents an innovative component of future inquiry.

One of the key findings of the UN-DESD Final Report was a need for more research into monitoring and evaluation to assist in the maturity of understanding and demonstration of the effectiveness of EfS (Buckler and Creech, 2014). There is growing recognition that good organizational and program management is integrally linked to well-designed monitoring and evaluation systems (Stem et al, 2005). For example, a core challenge of the Millennium Development Goals (MDGs) was in the financing and implementation of the interventions at scale. ‘Scale needs to be carefully planned and overseen to ensure successful and sustainable implementation’ (Sachs & McArthur, 2005, p. 351). The task becomes how to do so effectively—and that is where the monitoring and evaluation requirement was identified (Weiss, 1998). Future research should extend the existing criteria proposed to monitor and evaluate EfS programs through to measurable variables guided by a theoretical framework that accounts for scale. The research for this study leads the author to suggest that the development of a quantitative and qualitative index which measures the relative scalability of an EfS innovation across a wide spectrum of variations in context is appropriate. Understanding whether a program is succeeding is at best difficult given that there are limited standardized methods for measuring the scalability of an innovation in the field of education (Clarke, Dede, Ketelhut, & Nelson, 2006). By identifying factors within a program’s context that represent important conditions for success, and thereby summarizing the extent to which the effect of the program is sensitive to variation in each, a proposed ‘scalability index’
would provide prospective facilitators with a better sense of what the program’s likely effectiveness would be in their own particular circumstances (Clarke, et. al., 2006).

Ideally, future research would extend the understanding of significant international initiatives and the steady progress of globalisation, providing opportunities to better understand adaptive learning capacity which transcends national boundaries and governance structures. It is worth noting that monitoring and evaluation, globalisation and information technology are key driving factors of our time and as such they will have a significant impact upon the development of a resilient and sustainable international community (United Nations, 2003). In consequence, networks and organizations with a global reach and mandate will continue to perform a crucial role in the effort towards more sustainable practices. Investigating these issues would complement the existing body of work that has been conducted on monitoring and evaluation programs in an international context (Margoluis & Salafsky, 1998; Bellamy et al., 2004; Stem et al., 2005; Tilbury, 2007, 2009; Tilbury & Mulà, 2009).

In conclusion, the author observed that the UN-DESD did not implement a wide-ranging M&E framework at the outset of the decade but rather utilized the Decade to inform how M&E and Indicator Frameworks could be developed. It would be beneficial for future ‘Decade’ type initiatives to learn from the UN-DESD and to ensure an M&E Framework is in place prior to commencement to enable and improve the ability for M&E to be conducted across the entire scope of the initiative potentially leading to richer findings. Future research should also offer a contribution towards expanding current monitoring and evaluation indicators development, whilst considering the present somewhat limited knowledge, and the uncertainties of internationally accepted EfS monitoring and evaluation frameworks (Boswell, 1995; Bartelmus, 1997, 2008; Fricker, 1998; Woodhill, 2000; Tilbury & Janousek, 2006). Undoubtedly, a framework that incorporates scale and enables organizations to plan and manage the collection of performance data and analysis (including reporting and reviewing), will be an invaluable contribution to the effectiveness of EfS facilitation in the future and address the challenges indicated in the UN-DESD Final Report (Buckler & Creech, 2014). The post-2015 UN-DESD implementation and action plan provides a platform for future research. It is clear from the findings of the UN-DESD Final Report that monitoring and evaluation is key to understanding organizational and program delivery, however, further research regarding impact is required. In the wider context of the SDGs there is the opportunity to conduct research into the delivery of a broader set of goals on a grander scale. Programs
of evaluation for the SDGs are in their infancy. Their development requires significant academic and practical effort to be implemented such that they afford researchers a timeframe that supports effective implementation and capture of data as the 15 year journey is commencing.

6.5.2 A multi-scale approach inclusive of reflective dimensions

Demonstrated in this research is the theoretical understanding of scale as a means to re-conceptualize organizations and programs. Scaling out, back in and then out again would be conducive to monitoring and evaluation, whereby indicators (e.g. context, process, outcomes) could be examined before, during and after the program is facilitated. For example, the EfS program would scale out and in based upon a temporal or future focus identified through the conceptual changes that occur as the program continuously evolves (Figure 8). This evolution may even lead to a ‘tipping point’ where the program reaches critical mass and is adopted more widely.

![Figure 8. A future-focused approach to scale](image)

Additionally, applying a multi-scale approach that included these ‘reflective’ dimensions would provide an understanding for why and how the program evolved providing additional impetus for the M&E process. Scaling back in and out again demonstrates the non-linearity of this theoretical model. In future research, for example, there is the opportunity to examine how an organization learns to not only adapt to but
prepare for regional and global changes in policy or macro-economics. Examination of the temporal scale may elicit theoretical understanding of mitigation strategies that prepare organizations for sudden change. These pro-active approaches to scale are not yet well understood amongst DGN and would present a novel research focus. This avenue was not investigated in any more detail within this study.

6.5.3 Investigating propositional and procedural knowledge

It was fundamental to examining data through the theoretical framework that the analysis identified and expanded upon procedural knowledge, and not just propositional knowledge, both from organizational and program perspectives. This approach was detailed in the research’s epistemological approach and theoretical grounding (Chapter 4). The study’s methodology identified the importance of examining the knowledge relating to both how (i.e. procedural) and that (i.e. propositional) a phenomena is occurring. For example, the research identified during coding of data that accountability is important to the facilitation of EfS by DGNs. The findings demonstrate how accountability is implemented within DGNs to facilitate EfS is through the development and application of an appropriate monitoring and evaluation framework. Table 47 draws on the code manual developed for this study to illustrate a number of areas of potential future research identified throughout the course of this study and aligns them with propositional and procedural identifiers. These areas of research have been identified in this study in the context of EfS facilitation by DGNs, however, it is entirely plausible to conclude that they form the basis for individual studies both within and outside of the educational sector.

**Table 47.** Propositional and procedural alignment

<table>
<thead>
<tr>
<th>That... is significant (propositional)</th>
<th>How... is significant (procedural)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountability</td>
<td>Facilitate EfS through the application of a monitoring and evaluation frameworks.</td>
</tr>
<tr>
<td>Networks</td>
<td>Facilitate EfS through decentralisation.</td>
</tr>
<tr>
<td>Function</td>
<td>Facilitate EfS through a common methodology.</td>
</tr>
<tr>
<td>Governance</td>
<td>Facilitate EfS through phased organizational development</td>
</tr>
<tr>
<td>Democracy</td>
<td>Facilitate s EfS through bottom up and top down approaches.</td>
</tr>
<tr>
<td>Relevance</td>
<td>Facilitate EfS through recognition of contextual diversity.</td>
</tr>
</tbody>
</table>
In future research, for example, there may be the instance in which researchers are interested in addressing similar research questions but are focused upon a network that delivers health care services and programs at various scales internationally (e.g. Médecins Sans Frontières). A case study applying a multi-scale framework with embedded units of analysis unique to the particular field of study (e.g. healthcare) offers and opportunity for the researcher to examine the particular case whilst considering the criteria and/or findings of the organizational and/or program cases analyzed in this study (Baxter & Jack, 2008).

The process of investigating these two types of conceptual knowledge has been shown to be an important component of understanding processes more generally, as demonstrated in mathematical and statistical research (Haapasalo, 2003). Future research may examine further the connection between propositional and procedural knowledge specifically considering that concepts such as EfS are now understood as systemic learning processes as opposed to linear processes.

6.6 Concluding Reflection on the Research Process

The study was undertaken with the aim of developing an improved understanding for how DGNs facilitate effective EfS. However, the present title and research focus have evolved throughout the past seven years from the original research outline submitted in April, 2008. At that time, the project was titled ‘Facilitating effective education for sustainability within secondary schools’. The current title of, and the context for, the study of EfS evolved from the study’s author developing a research relationship with the Environment and Schools Initiative (ENSI) and interaction with the UN-DESD as a doctoral student and professional in Australia. This researcher commenced this study with the development of a research journal a key component of reflective practice. Critical reflection using this research journal began in June 2008. The process of casting back through this journal has demonstrated the importance of focusing on the research questions and applying a specific methodology prior to analysing data; however, the journal was utilized more for reflective practice on the process of writing the thesis, and the evolution of the authors ideas, then for delivering the methodology. It is worth noting that the researcher’s perceived role in formulating and conducting this inquiry has matured and review of the journal demonstrates the progression in analysis from being
very much focused upon the practical (e.g. the prac-ademic approach) to a more deliberate focus upon the development of theory and a unique contribution to academic study.

From a philosophical perspective, the focus upon multiple layers of knowledge (i.e. propositional and procedural) and the application of an interpretive and constructive methodology were appropriate avenues of exploration. They provided a useful theoretical and analytical framework with which to probe organizational and program levels through a multi-scale approach, and to test a little understood theory of how scale related to the facilitation of EfS, or why it would be important to understand its theoretical applicability better. This research has helped develop theory that provides an improved understanding of a multi-scale approach and has afforded the researcher the opportunity to examine scale through the empirical observations, experiences and actions of those involved in DGNs. The study has revealed the inadequacies of a uni-scale approach to EfS facilitation when dealing with complex and dynamic phenomena such as networks and sustainability challenges. The author now has a greatly enhanced appreciation for the underlying mechanisms and constraints of incorporating scale into delivery methods of any organization or program.

The methodological limitations of this study have been discussed briefly in section 4.8, however, it should be noted that the author’s selection of a European-dominated DGNs organizational case provided challenges. Most significantly was the geographical divide between the researcher and its subject, which for the past five years has had a significantly diminished presence in Australia. Excluding a trip to Switzerland in mid-2008 to meet with the ENSI DGN the remainder of the research was conducted at distance. In addition, the FEE network was involved as a research participant and this contributed to both the pool of data analyzed and the complexity of the study. Although considered, a comparative analysis of these two organizations was not pursued as the researcher concluded that this would not add substantially to this particular course of study due to the focus being upon effective facilitation of EfS and not effective DGN governance or management. The researcher certainly endorses future research to examine DGNs further afield of the EfS sector and in places such as China, and to test the dimensions identified as characteristic in this study. Application of the comparative analysis method at an organizational level would be an appropriate course of inquiry.

From a personal learning and development perspective the research has offered the author insights into how education is delivered on an international scale more generally. Taking on the role of a researcher and an educator in the field of EfS has given me a new
appreciation of the complexity of the subject matter. As indicated the initial inclination was to attempt to examine theory and data collected from the perspective of a practicing educator. It was not until the focus was firmly placed upon theoretical development that the author was better enabled to seek in-depth casual explanations from within the data. This allowed the researcher to conduct the research from outside the scope of the Community of Practice enabling a more objective and holistic view of the DGNs system. The refinement of this approach, although gradual and learned, contributed to the author developing an understanding of theoretical research and will undoubtedly contribute to the development of future research projects.

6.7 Chapter Six Conclusion

The study has presented a unique contribution to the field of EfS in illustrating the application of a global, multi-scale theoretical approach to the examination of the facilitation of EfS at organizational and program levels. In concluding this thesis the author draws attention to the prospective significance of this research to the field of sustainability well beyond EfS through a comparison with the application of this approach in one of the world’s most diverse and multi-faceted sectors, the shipping industry (i.e. ship-based national and international trade). The author has selected shipping in which to draw comparison as it provides a strong example of the framework and is the industry in which the author currently works as a sustainability specialist (i.e. Gladstone Ports Corporation, Queensland, Australia).

In the early 20th century vessels were loaded and unloaded by using crates of varying sizes and shapes. This unstandardized approach contributed to safety and complexity challenges as well as operational inefficiency. In 1955, a truck driver named Malcolm McLean proposed standardized shipping containers as a means to solve the challenges presented by this complex system. He examined the entire supply chain and recognized shipping as only one part of a much wider logistics system. McLean innovated to design a standardized container that could be used to deliver goods across the entire system. Early take up was slow, however, with the uptake of standardized containerization by the U.S. Navy and demonstration of cost and operational efficiencies it wasn’t long before the world’s shipping operators adopted the containerization approach. The initial challenge that McLean addressed as a disruptive innovator is now a staple of the shipping industries logistics system and over 90% of all goods are shipped in standardized containers (Draper, 2013).
Containerisation has standardised an overly complex system (i.e. logistics) but the complexities still exist (i.e. goods inside the containers). Containerisation is a facilitator that assists the system to be understood and adapted to all different conditions (i.e. ships and seas, not unlike contexts and people or needs). Containerization represents a plausible metaphor for EfS, yet does not quite encompass its complexity in its entirety. Granted, facilitating EfS is not as tangible as packaging up goods in standard sized containers; however, EfS programs are ‘containers’ of sorts, comprising packages of sustainability knowledge and skills. These ‘packages’ (i.e. programs) could in fact be standardized or, rather, mainstreamed. Not unlike the shipping industry the methods through which EfS programs are delivered (i.e. vessels/ships) and the varying aims and outcomes of program facilitation (i.e. destinations) are vastly different and each is dependent upon context and audience (i.e. shipping registers). Unlike a relatively straightforward shipping containers impact upon logistics, EfS facilitation impacts upon a much wider system inclusive of a multitude of sectors such as sustainable building design, food productivity, renewable energy and resource resilience. In the shipping industry, the realization of scale was complete when the shipping operators adopted containerization and amended their systems to suit. It is unclear now whether organizational values and culture led the way in prompting this change or whether or not they were lagging behind the commercial imperative. The catalyst, it appears, emanated from an ‘adapt or die’ perception (Draper, 2013). EfS is not currently addressing the systemic challenges of sustainability more broadly and remains just short of what could be considered a systemic catalyst adopted universally. In reality, based upon current research into the proliferation of EfS networks as presented in Section 6.4.1, the tipping point may not be far off, but the focus of the GAP-ESD on priorities not yet recognized indicates that we aren’t there yet. The question we can now ask of the sustainability sector is when will it’s ‘adapt or die’ moment come? Have we identified how to reach the tipping point and what or who will tip us over? Have educators found the appropriate model to 'containerize' EfS? Are we utilizing the right vessels? These questions illustrate that further investigation is required and that answers are not yet in place.

The innovation process applied in the shipping industry draws parallels with that of the process of delivering EfS. Educators may recognize the initial challenge of providing opportunities for people to gain the awareness, attitudes, knowledge, skills and participation processes necessary to address challenges of sustainability more systemically. They may recognize education as a significant aspect of a much broader
sustainability system, and identify EfS as a means to address these above-mentioned challenges. Not unlike the shipping innovators, educators identified the requirement of a ‘tipping point’ in engagement to deliver EfS at scale. This analogy speaks to the complexities of ‘packaging’ EfS programs for delivery under differing contexts as is too often the case. EfS, and the debate around colonialization through standardisation is a contemporary issue. The question looms, can this standardisation ever be successful? Shipping demonstrated that it can, however, requires not only the physical container to be standardised but the accompaniment of innovation in governance, and the cultural and values-based dynamics themselves. This alignment is the ‘tipping point’ in EfS that the author argues has not yet be reached. The UN-DESD was launched to stimulate a tipping point, whereby, society would be saturated with EfS programs embedded into every facet of culture and community - as an integral and in-built component of educational systems. However, this researcher concludes that EfS hasn’t yet reached that tipping point as previously envisioned.

The UN-DESD has broken new ground by introducing opportunities for, and highlighting challenges to, effective facilitation of EfS. Findings post-UN-DESD recognized that there were a number of priorities that represented opportunities to develop further understanding and to address sustainability actions (UNESCO, 2014). The emerging Sustainable Development Goals (SDG) coincide with the conclusion of the period marked by the delivery of the MDGs and UN-DESD. They contribute to these initiatives key aims and objectives. A key SDG 2030 goal is to assist learners to acquire the knowledge and skills that are needed to promote sustainable development reaffirming the importance of education to this process (UN, 2014). The approaches required to meet this goal are complex as a result of educations dynamic and multi-dimensional nature. Examining EfS from a multi-scale approach accounts for this inherent complexity and, although the ‘tipping point’ may be evolutionary and unforeseen, leaders agree that more than a decade will be required to scale EfS (Buckler & Creech, 2014). The approach substantiated by this research provides a solid foundation for addressing the systems innovation necessary for EfS to contribute solutions to the economic, social and environmental challenges facing society now and in the future.
References
References


222


Haapasalo, L. (2003). The conflict between conceptual and procedural knowledge: *Should we need to understand in order to be able to do, or vice versa*. Paper presented at the Proceedings on the IXIX Symposium of the Finnish Mathematics and Science Education Research Association, University of Joensuu, Bulletins of the Faculty of Education.


Appendices
Appendix 1. Three Waves of Sustainability.

**THE FIRST WAVE:**
The Green Revolution

It was within the framework of the Cold War, the hippie movement and the May Revolt in France that the first ecological organizations, such as Greenpeace, emerged. It was also during this period that the first environmentally aware companies—Patagonia and Nature—came onto the market.

**THE SECOND WAVE:**
Market Economy Comes to the Forefront

The Berlin Wall comes down and democratic systems take a foothold in Latin America. The Exxon Valdez oil tanker spill makes people start taking the ecological movement seriously. Marketing begins to adopt “green” messages on a massive scale.

**THE THIRD WAVE:**
Toward Responsible Globalization

Globalization bursts onto the scene, and anti-globalization with it. The Internet grows at a swift pace, bringing the birth of participative media, and ad agencies begin to study on-line advertising. Companies like Shell and Nike face complaints regarding their production processes and must account for their actions before society.

- **1961**
  - Amnesty International, the World Wildlife Fund (WWF) and the Organization for Economic Cooperation and Development (OECD) are founded.

- **1983**
  - The UN creates the World Environment and Development Commission.

- **1984**
  - Bhopal Disaster (India).

- **1986**
  - Chernobyl Disaster (USSR).

- **1999**
  - Battle in Seattle (USA).

- **2000**
(Van Peborgh, 2008). An adaptation of J. Elkington’s work.
**Appendix 2. The Fifteen Currents in Environmental Education**

<table>
<thead>
<tr>
<th>Current</th>
<th>Conception of Environment</th>
<th>Aims of Environmental Education</th>
<th>Dominant Approaches</th>
<th>Examples of Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Naturalist</td>
<td>Nature</td>
<td>Reconstruct a link with nature.</td>
<td>Sensorial, Cognitive, Affective, Experiential, Creative/Aesthetic</td>
<td>Immersion; interpretation; Sensorial games; Discovery activities.</td>
</tr>
<tr>
<td>2. Conservationist/Resourcist</td>
<td>Resource</td>
<td>Adopt behaviours compatible with conservation. Develop skills related to environmental management.</td>
<td>Cognitive, Pragmatic</td>
<td>Guide or code of behaviours; 3 Rs set of activities; Environmental audit; Conservation project.</td>
</tr>
<tr>
<td>5. Scientific</td>
<td>Object of Study</td>
<td>Acquire knowledge in environmental sciences. Develop skills related to the scientific method.</td>
<td>Cognitive, Experiential</td>
<td>Study of phenomena; Observation; Demonstration; Experimentation: Hypothetico-deductive research activity.</td>
</tr>
<tr>
<td>6. Humanist/Mesological</td>
<td>Living Milieu</td>
<td>Know and appreciate one’s milieu of life; better know oneself in relation to this living milieu. Develop a sense of belonging.</td>
<td>Sensorial, Affective, Cognitive, Experiential, Creative/Aesthetic</td>
<td>Itinerary; Landscape reading; Study of milieu; investigation.</td>
</tr>
<tr>
<td>7. Value-centered</td>
<td>Field of Values</td>
<td>Adopt eco-civic behaviours. Develop a system of ethics.</td>
<td>Cognitive, Affective, Moral</td>
<td>Analysis of values; Clarification of values; Criticism of social values.</td>
</tr>
</tbody>
</table>
### Appendix 2. Continued.

<table>
<thead>
<tr>
<th>Current</th>
<th>Conception of Environment</th>
<th>Aims of Environmental Education</th>
<th>Dominant Approaches</th>
<th>Examples of Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.Holistic</td>
<td><em>Holos, Gaïa, All, The Being</em></td>
<td>Develop the many dimensions of one’s being in interaction with all aspects of the environment. Develop an “organic” understanding of the world and participatory action in and with the environment.</td>
<td>Holistic, Organic, Intuitive, Creative</td>
<td>Free exploration; visualization; Creative workshops; Integration of complementary strategies.</td>
</tr>
<tr>
<td>9.Bioregionalist</td>
<td>Place of belonging, Community project</td>
<td>Develop competencies in/for local or regional community ecodevelopment.</td>
<td>Cognitive, Affective, Experiential, Pragmatic, Creative</td>
<td>Exploration of our shared milieu; Community project; Project of local or regional ecodevelopment.</td>
</tr>
<tr>
<td>10.Praxic</td>
<td>Locus of action/reflection</td>
<td>Learn in, by, and for environmental action. Develop reflexive skills.</td>
<td>Praxic</td>
<td>Action-research; Reflexive posture in activities or project.</td>
</tr>
<tr>
<td>11.Socially Critical</td>
<td>Object of transformation, Place of emancipation</td>
<td>Deconstruct socio-environmental realities in view of transforming them and transforming people in this process.</td>
<td>Praxic, Reflexive, Dialogic</td>
<td>Analysis of discourses; Case study, Debate, Action-research.</td>
</tr>
<tr>
<td>13.Ethnographic</td>
<td>Territory, Place of identity, Nature/culture</td>
<td>Recognize the close link between nature and culture. Clarify one’s own cosmology. Valorize the cultural dimension of one’s relationship with the environment.</td>
<td>Experiential, intuitive, Affective, Symbolic, Spiritual, Creative/Aesthetic</td>
<td>Fables, Stories and legends; Case study; Immersion; Modelling; Mentoring.</td>
</tr>
</tbody>
</table>
Appendix 2. Continued.

<table>
<thead>
<tr>
<th>Current</th>
<th>Conception of Environment</th>
<th>Aims of Environmental Education</th>
<th>Dominant Approaches</th>
<th>Examples of Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. Eco-Education</td>
<td>Role of interaction for personal development, Locus of identity construction</td>
<td>Experience the environment to experience oneself and to develop in and through it. Construct one’s relationship with the “otherthan-human world”.</td>
<td>Experiential, Sensorial, Intuitive, Affective, Symbolic, Creative</td>
<td>Life story; Immersion; Exploration; Games; Introspection; Sensitive listening; Subjective/objective alternance.</td>
</tr>
<tr>
<td>15. Sustainable Development/</td>
<td>Resource for economic development, Shared resource for sustainable living</td>
<td>Promote economic development that takes care of social equity and ecological sustainability; Contribute to such development.</td>
<td>Pragmatic, Cognitive</td>
<td>Case study; Social marketing; Sustainable consumption activities; Sustainable living management project.</td>
</tr>
</tbody>
</table>

(Sauvé & Berryman, 2005)
Appendix 3. Organizational Interview Questions and Justifications

The questions will provide information about ENSI and the operation of ENSI (informing the program case and answering the first research question).

1. What do you consider to be the role of the Environment and School Initiatives (ENSI)?

   Justification: The question is examining the perceived role of ENSI as an organization from a macro/organizational perspective. The question will frame the role that ENSI enacts as an organization facilitating EfS and inform the examination of key organizational factors influencing the programs (i.e. case studies) that will be examined in the second phase of data collection.

   The data collected via this question will be used to identify the organizational drivers which may not have been explicitly identified, nor monitored, as key indicators that ENSI has been enacting its role as a facilitator of EfS. This question will also provide input into the examination of ENSI’s success, or lack thereof, scaling in (i.e. learning and value-based) development.

2. What was your primary role in relation to your relationship with ENSI?

   Justification: The question provides insight into the role of the individual within the organization whilst examining the ‘human capital’ drivers for ENSI stakeholders.

   The data collected via this question will provide insight into the actors that play a part in ENSI’s facilitation of EfS and their role in this process. It also provides an inventory of roles and their relationship to ENSI projects which will be examined in the next phase of data collection.

3. What are the strengths of the ENSI association?

   Justification: The question examines the perceived areas of strength as they relate to the organization potentially highlighting areas of opportunity and/or barriers that, for example, affect the ability of ENSI to enact the role of a facilitator of EfS.

   The data collected can be used to identify the strengths, weaknesses, barriers and threats that face decentralized, global organizations when attempting to scale up (organizational) and scale out (geographical) their organization and associated
4. What are the weaknesses of the ENSI association?

Justification: The question examines the perceived areas of weakness as they relate to the organization potentially highlighting areas of opportunity and/or barriers that, for example, affect the ability of ENSI to enact the role of a facilitator of EfS.

The data collected can be used to identify the strengths, weaknesses, barriers and threats that face decentralized, global organizations when attempting to scale up (organizational) and scale out (geographical) their organization and associated programs.

5. As indicated in the ENSI Constitution, the organization's chief aim is to support educational and pedagogical development that promote insight into learning for sustainable development, environmental studies, and active forms of learning and teaching. From your experience, can you comment on how effective the strategies of ENSI are in achieving this aim? Capacity to enact the strategies?

Justification: The question is a key question for identifying the strategies (as it should naturally tease out these strategies) that are being used by ENSI to facilitate EfS at an organizational/macro level. These core strategies will be important to the delivery of EfS program as they may filter down into program methodology and delivery. The question will provide context for the evaluation of case studies and subsequent phase two data collection.

Responses from this question will provide significant input into the examination of ENSI as a facilitator of EfS and present some key learning linking strategy to organizational objectives whereby the research can examine further the relationship between the macro level and micro level and the affect this relationship may have upon the said facilitation.

6. What do you perceive are the aims and intended accomplishments of the Decade of Education for Sustainable Development (DESD)?

Justification: The question examines the contextual drivers of the DESD upon ENSI and the view of the Interviewee regarding the impact of the DESD upon ENSI’s fourth wave of development.
7. How are the aims for the DESD monitored and evaluated to establish whether or not progress is being made?

   Justification: The questions collects data on the relationship of monitoring and evaluation to the DESD and any correlations to the M&E frameworks applied to ENSI.

8. How does ENSI contribute to the Decade of Education for Sustainable Development (DESD)?

   Justification: The question frames the research in the context of a significant international policy initiative (i.e. UN-DESD) and can provide data that presents a snapshot of a decentralized, global organizations role in the implementation of global policy initiatives. The question may also provide some insight into the connection between global drivers of EfS facilitation and the organizations that actually perform the function of delivering upon the objectives set out by these global drivers. The question will provide insight into the global drivers that, for example, may lead to the development of projects that seek address these drivers. The impact of these drivers upon projects (e.g. ENSI case studies) will form a significant part of the phase two data collection.

   The data collected will be presented in the thesis as a component of the monitoring and evaluation frameworks theoretical basis. The creation of policy is a significant driver of organizational behaviour and has a strong impact upon both scalability and project development. Examining these high level drivers can provide insight into, for example, the reasons why a particular methodology is selected, actors are engaged, and projects are formulated leading, eventually, to facilitation outcomes (ultimately successful or unsuccessful – depending upon the measurement and data being collected).
Appendix 4. Program Interview Questions

The questions will provide information about ENSI projects (informing the micro case and answering the second research question).

1. What ENSI activities/projects/programs have you been involved in and how were you involved?

   Justification: The question will provide further insight into the role of key actors within a project/program and their relationships to the facilitation process. The question will also shed light on the decentralized nature of the projects/programs as the informants will no doubt be both geographically and organizational dispersed. Involvement by some informants may also be multilayered (i.e. at a project and/or organizational level) providing for further depth in the research examining interaction with the case studies.

2. How does ENSI facilitate EfSD activities/projects/programs?

   Justification: The question examines the facilitation of projects at a micro level providing insight into the strategies used to facilitate EfS at a delivery level. The question will provide information about the aspects of a project/program that are scalable (geographically and organizationally). The question should illuminate a number of key areas required to monitor and evaluate projects/programs within the context of organizational and facilitation objectives.

3. What aspects of ENSI activities/projects/programs have, in your opinion, been successful?

   Justification: The question will examine the barriers, opportunities, weaknesses and strengths of specific case studies and their impact upon the facilitation of EfS. The question will provide insight into the attributes of projects that have been deemed successful and how this has contributed to the facilitation, or lack thereof, of EfS.

4. Why were these activities/projects/programs successful?

   Justification: The question will examine the barriers, opportunities, weaknesses and strengths of specific case studies and their impact upon the facilitation of EfS. The question will provide insight into the attributes of projects that have been deemed successful or unsuccessful (by way of not being identified) and how this has contributed to the facilitation, or lack thereof, of EfS.
5. What has ENSI learned from successful and unsuccessful projects? Prompt on successful and unsuccessful

Justification: As per question d, this question will examine the attributes of ENSI projects that have led to the facilitation of EfS. The question will also provide insight into aspects of scalability as the lessons learned will likely point towards opportunities and barriers that may hinder a decentralized, global organizations ability to scale up and out projects.
Appendix 5. Survey Questions

1. What are the most important roles a decentralised network can play in facilitating Education for Sustainable Development (EfS)? Please rank (from 1 being most important to 6 being least important).
   b. Linking theory with practice.
   c. Establishing a community of practice.
   d. Educating others in EfS facilitation.
   e. Advancing the body of knowledge for EfS.
   f. Providing structure through Administration.

2. Please explain your ranking.

3. Do you believe that there are other roles for a decentralised network facilitating EfS?

4. What are the most significant challenges for decentralised networks facilitating EfS? Please rank (from 1 being most important to 5 being least important).
   a. Maintaining continuity of research and practice.
   b. Attracting new members.
   c. Retaining existing members.
   d. Obtaining funding/income.
   e. Monitoring and evaluating outcomes.
   f. Relevance to contemporary government policies and priorities.

5. Please explain your ranking.

6. Do you believe that there are other challenges for a decentralised network facilitating EfS?

7. Of the following aspects of organizational capacity, which are important to decentralised networks that facilitate EfS projects? Please rank (from 1 being most important to 4 being least important).
   a. Continuity of funding over a period of time longer than the life of most major projects (i.e. 5 years plus).
b. Accountability to key stakeholders including, but not limited to, project/program funders, research participants, and organizational staff.

c. Democratic organization whereby all members have a say.

d. Monitoring and evaluation systems in place to evaluate meeting EfS facilitation goals and objectives.

8. Please explain your ranking.

9. Do you believe that there are other core organizational capacities required of decentralised networks facilitating EfS?

10. Which of the following aspects are important to the functioning of decentralised EfS network’s across extensive geographical scales? Please rank (from 1 being most important to 4 being least important).

   a. A network that allows for the expansion of the community of practice across geographical boundaries.

   b. Accountability to key stakeholders including, but not limited to, project/program funders, research participants, and organizational staff.

   c. Democratic organization whereby all members have a say.

   d. Monitoring and evaluation systems in place to evaluate meeting EfS facilitation goals and objectives.

11. Please explain your ranking.

12. Can you suggest any additional core spatial capacities required of decentralised networks facilitating EfS?

13. Which of the following aspects of organizational culture/values are important to the effective delivery of EfS through a decentralised network? Please rank (from 1 being most important to 4 being least important).

   a. Relevance to the stakeholders that both deliver and experience the facilitation of EfS to ensure the attraction and retention of organization members and project participants.
b. Accountability to key stakeholders including, but not limited to, project/program funders, research participants, and organizational staff.

c. Democratic organization whereby all members have a say.

d. Monitoring and evaluation systems in place to evaluate meeting EfS facilitation goals and objectives.

14. Please explain your ranking.

15. Can you suggest any additional value-based capacities required of decentralised networks facilitating EfS?

16. What do you believe are the benefits of decentralised networks monitoring and evaluating their projects? Please rank (from 1 being most important to 5 being least important).

   a. To identify the strengths and weaknesses of projects.

   b. To provide feedback to key stakeholders (e.g. project participants, funders, academic community, etc.)

   c. To identify the need for future projects and project areas.

   d. To provide for the further development of the EfS body of knowledge in general.

   e. To enable ongoing learning and improvement to the practice of EfS.

17. Please explain your ranking.

18. Can you suggest any additional benefits of a decentralised network monitoring and evaluating their EfS projects?
### Appendix 6. Key Organizational Documents

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Writer(s)/Publisher</th>
<th>Publication Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Project ENSI</td>
<td>P. Posch</td>
<td>1988</td>
</tr>
<tr>
<td>The Impact of the ENSI Project on School-Community Relations: Issues and Possibilities</td>
<td>P. Posch</td>
<td>1990</td>
</tr>
<tr>
<td>The OECD/CERI decentralised network &quot;Environment and School Initiatives&quot; (ENSI) A Reflection on Networking Experiences</td>
<td>P. Posch</td>
<td>1990</td>
</tr>
<tr>
<td>“Non-Educational” Tasks in Education and the Emergence of Dynamic Networks</td>
<td>P. Posch</td>
<td>1991</td>
</tr>
<tr>
<td>Environment and School Initiatives: Background and Basic Premises of the Project</td>
<td>P. Posch</td>
<td>1991</td>
</tr>
<tr>
<td>‘The Study ENSI: Phase 1’ in Evaluating Innovation in Environmental Education</td>
<td>P. Posch in OECD</td>
<td>1994</td>
</tr>
<tr>
<td>‘Evaluating the outcomes of Environment and School Initiatives’ in Evaluating Innovation in Environmental Education</td>
<td>M. Mayer in OECD</td>
<td>1994</td>
</tr>
<tr>
<td>From the Pilot to the Mainstream: Generalisation of good practice in international environmental education</td>
<td>ENSI and OECD</td>
<td>1999</td>
</tr>
<tr>
<td>The Role of the Environment and School Initiatives (ENSI)</td>
<td>S. Smith</td>
<td>2004</td>
</tr>
<tr>
<td>Meeting Minutes of ENSI and OECD-CERI</td>
<td>J. Looney, G. Pfaffenwimmer and N. Bedlington</td>
<td>2005</td>
</tr>
<tr>
<td>Summary Notes of a Meeting between UNESCO and ENSI</td>
<td>Pfaffenwimmer and N. Bedlington</td>
<td>2005</td>
</tr>
<tr>
<td>ENSI Strategic Plan</td>
<td>ENSI Secretariat and Executive</td>
<td>2005</td>
</tr>
<tr>
<td>ENSI Explanatory Memorandum</td>
<td>ENSI Secretariat</td>
<td>2006</td>
</tr>
<tr>
<td>Title</td>
<td>Author(s)</td>
<td>Year</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Cooperation between OECD-CERI and ENSI ivzw (INPA) concerning the OECD-CERI programme ‘Innovative learning environments’</td>
<td>ENSI Secretariat and W. Sleurs</td>
<td>2009</td>
</tr>
<tr>
<td>Progress and Possibilities for the UN Decade of Education for Sustainable Development (DESD) in EU Member States</td>
<td>I. Mula and D. Tilbury</td>
<td>2009</td>
</tr>
<tr>
<td>Meeting Minutes of the ENSI Executive</td>
<td>ENSI Secretariat and Executive</td>
<td>2009</td>
</tr>
<tr>
<td>Lifelong Learning Programme Application (Project Management and Financial)</td>
<td>ENSI Secretariat</td>
<td>2011</td>
</tr>
<tr>
<td>ENSI Annual Reports</td>
<td>ENSI Secretariat and Executive</td>
<td>2005 to 2012</td>
</tr>
<tr>
<td>ENSI Website (<a href="http://www.ensi.org">www.ensi.org</a>)</td>
<td>ENSI Secretariat and various authors</td>
<td>2005 to 2014</td>
</tr>
<tr>
<td>E-mail Correspondence with ENSI Secretariat, Executive, Project and Country Managers (past and present)</td>
<td>Various authors</td>
<td>2008 to 2014</td>
</tr>
</tbody>
</table>
# Appendix 7. Phase 1 - Organizational interviews

<table>
<thead>
<tr>
<th>Project</th>
<th>Interviewee</th>
<th>Date</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot Interview</td>
<td>Interviewee 1</td>
<td>Feb. 2012</td>
<td>55 mins</td>
</tr>
<tr>
<td>Pilot Interview</td>
<td>Interviewee 2</td>
<td>Feb. 2012</td>
<td>32 mins</td>
</tr>
<tr>
<td>Pilot Interview (former Country Coordinator)</td>
<td>Interviewee 3</td>
<td>Feb. 2012</td>
<td>64 mins</td>
</tr>
<tr>
<td>ENSI Executive</td>
<td>Interviewee 4</td>
<td>Mar. 2012</td>
<td>31 mins</td>
</tr>
<tr>
<td>ENSI Country Coordinator</td>
<td>Interviewee 5</td>
<td>Mar. 2012</td>
<td>39 mins</td>
</tr>
<tr>
<td>ENSI Executive</td>
<td>Interviewee 6</td>
<td>Mar. 2012</td>
<td>31 mins</td>
</tr>
<tr>
<td>ENSI Executive</td>
<td>Interviewee 7</td>
<td>Apr. 2012</td>
<td>31 mins</td>
</tr>
<tr>
<td>ENSI Country Coordinator</td>
<td>Interviewee 8</td>
<td>Apr. 2012</td>
<td>37 mins</td>
</tr>
<tr>
<td>ENSI Executive (former)</td>
<td>Interviewee 9</td>
<td>Apr. 2012</td>
<td>34 mins</td>
</tr>
</tbody>
</table>
Appendix 8. Leximancer word identification map
## Appendix 9. Pattern Matching

<table>
<thead>
<tr>
<th>concept</th>
<th>ENSI</th>
<th>education</th>
<th>environmental</th>
<th>research</th>
<th>sustainable</th>
<th>people</th>
<th>development</th>
<th>specific</th>
<th>questions</th>
<th>schools</th>
<th>projects</th>
<th>school</th>
<th>different</th>
<th>project</th>
<th>national</th>
<th>work</th>
<th>sense</th>
<th>idea</th>
<th>network</th>
<th>countries</th>
<th>decade</th>
<th>level</th>
<th>support</th>
<th>sustainability</th>
<th>real</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENSI</td>
<td>321</td>
<td>61</td>
<td>61</td>
<td>60</td>
<td>27</td>
<td>38</td>
<td>25</td>
<td>38</td>
<td>36</td>
<td>31</td>
<td>33</td>
<td>29</td>
<td>28</td>
<td>32</td>
<td>31</td>
<td>26</td>
<td>29</td>
<td>20</td>
<td>37</td>
<td>22</td>
<td>15</td>
<td>14</td>
<td>12</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>education</td>
<td>61</td>
<td>206</td>
<td>195</td>
<td>47</td>
<td>41</td>
<td>27</td>
<td>39</td>
<td>32</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>23</td>
<td>20</td>
<td>12</td>
<td>18</td>
<td>22</td>
<td>11</td>
<td>13</td>
<td>16</td>
<td>15</td>
<td>15</td>
<td>12</td>
<td>18</td>
<td>26</td>
<td>33</td>
</tr>
<tr>
<td>environmental</td>
<td>61</td>
<td>195</td>
<td>196</td>
<td>45</td>
<td>39</td>
<td>26</td>
<td>37</td>
<td>31</td>
<td>20</td>
<td>21</td>
<td>21</td>
<td>20</td>
<td>11</td>
<td>18</td>
<td>22</td>
<td>11</td>
<td>13</td>
<td>15</td>
<td>14</td>
<td>15</td>
<td>10</td>
<td>18</td>
<td>26</td>
<td>32</td>
<td>19</td>
</tr>
<tr>
<td>research</td>
<td>60</td>
<td>47</td>
<td>45</td>
<td>182</td>
<td>16</td>
<td>30</td>
<td>15</td>
<td>25</td>
<td>27</td>
<td>27</td>
<td>24</td>
<td>28</td>
<td>16</td>
<td>17</td>
<td>22</td>
<td>12</td>
<td>17</td>
<td>17</td>
<td>10</td>
<td>9</td>
<td>7</td>
<td>16</td>
<td>17</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>sustainable</td>
<td>27</td>
<td>41</td>
<td>39</td>
<td>16</td>
<td>95</td>
<td>13</td>
<td>87</td>
<td>31</td>
<td>23</td>
<td>10</td>
<td>7</td>
<td>13</td>
<td>18</td>
<td>11</td>
<td>7</td>
<td>4</td>
<td>13</td>
<td>10</td>
<td>3</td>
<td>13</td>
<td>24</td>
<td>5</td>
<td>4</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>people</td>
<td>38</td>
<td>27</td>
<td>26</td>
<td>30</td>
<td>13</td>
<td>155</td>
<td>12</td>
<td>15</td>
<td>17</td>
<td>9</td>
<td>22</td>
<td>7</td>
<td>19</td>
<td>11</td>
<td>16</td>
<td>17</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>5</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>development</td>
<td>25</td>
<td>39</td>
<td>37</td>
<td>15</td>
<td>87</td>
<td>12</td>
<td>87</td>
<td>30</td>
<td>23</td>
<td>8</td>
<td>7</td>
<td>11</td>
<td>17</td>
<td>10</td>
<td>7</td>
<td>4</td>
<td>11</td>
<td>8</td>
<td>3</td>
<td>12</td>
<td>22</td>
<td>4</td>
<td>4</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>specific</td>
<td>38</td>
<td>32</td>
<td>31</td>
<td>25</td>
<td>31</td>
<td>15</td>
<td>30</td>
<td>79</td>
<td>29</td>
<td>9</td>
<td>15</td>
<td>10</td>
<td>17</td>
<td>8</td>
<td>13</td>
<td>7</td>
<td>14</td>
<td>17</td>
<td>3</td>
<td>3</td>
<td>10</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>questions</td>
<td>36</td>
<td>21</td>
<td>20</td>
<td>27</td>
<td>23</td>
<td>17</td>
<td>23</td>
<td>29</td>
<td>84</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>17</td>
<td>8</td>
<td>19</td>
<td>9</td>
<td>14</td>
<td>13</td>
<td>8</td>
<td>4</td>
<td>11</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>schools</td>
<td>31</td>
<td>22</td>
<td>21</td>
<td>27</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>142</td>
<td>8</td>
<td>25</td>
<td>11</td>
<td>12</td>
<td>9</td>
<td>9</td>
<td>11</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>projects</td>
<td>33</td>
<td>23</td>
<td>21</td>
<td>24</td>
<td>7</td>
<td>22</td>
<td>7</td>
<td>5</td>
<td>15</td>
<td>6</td>
<td>8</td>
<td>98</td>
<td>14</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>12</td>
<td>8</td>
<td>6</td>
<td>12</td>
<td>10</td>
<td>4</td>
<td>12</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>school</td>
<td>29</td>
<td>20</td>
<td>20</td>
<td>28</td>
<td>13</td>
<td>7</td>
<td>11</td>
<td>10</td>
<td>7</td>
<td>25</td>
<td>14</td>
<td>108</td>
<td>9</td>
<td>9</td>
<td>15</td>
<td>9</td>
<td>5</td>
<td>7</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>10</td>
<td>6</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>different</td>
<td>28</td>
<td>12</td>
<td>11</td>
<td>16</td>
<td>18</td>
<td>19</td>
<td>12</td>
<td>17</td>
<td>17</td>
<td>11</td>
<td>13</td>
<td>9</td>
<td>92</td>
<td>15</td>
<td>8</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>6</td>
<td>16</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>project</td>
<td>32</td>
<td>18</td>
<td>18</td>
<td>17</td>
<td>11</td>
<td>11</td>
<td>10</td>
<td>8</td>
<td>12</td>
<td>14</td>
<td>9</td>
<td>15</td>
<td>121</td>
<td>12</td>
<td>10</td>
<td>6</td>
<td>10</td>
<td>5</td>
<td>17</td>
<td>0</td>
<td>4</td>
<td>9</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>national</td>
<td>31</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>7</td>
<td>16</td>
<td>7</td>
<td>13</td>
<td>19</td>
<td>9</td>
<td>15</td>
<td>15</td>
<td>8</td>
<td>12</td>
<td>56</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>6</td>
<td>6</td>
<td>11</td>
<td>8</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>work</td>
<td>26</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>4</td>
<td>17</td>
<td>4</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>12</td>
<td>9</td>
<td>9</td>
<td>10</td>
<td>8</td>
<td>111</td>
<td>6</td>
<td>8</td>
<td>12</td>
<td>8</td>
<td>6</td>
<td>12</td>
<td>6</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>sense</td>
<td>29</td>
<td>13</td>
<td>13</td>
<td>17</td>
<td>13</td>
<td>12</td>
<td>11</td>
<td>14</td>
<td>14</td>
<td>11</td>
<td>8</td>
<td>5</td>
<td>11</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>63</td>
<td>11</td>
<td>5</td>
<td>9</td>
<td>4</td>
<td>10</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>idea</td>
<td>20</td>
<td>16</td>
<td>15</td>
<td>17</td>
<td>10</td>
<td>14</td>
<td>8</td>
<td>17</td>
<td>13</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>13</td>
<td>10</td>
<td>7</td>
<td>8</td>
<td>11</td>
<td>60</td>
<td>5</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>network</td>
<td>37</td>
<td>15</td>
<td>14</td>
<td>10</td>
<td>3</td>
<td>16</td>
<td>3</td>
<td>3</td>
<td>8</td>
<td>7</td>
<td>12</td>
<td>12</td>
<td>6</td>
<td>5</td>
<td>9</td>
<td>12</td>
<td>5</td>
<td>5</td>
<td>73</td>
<td>4</td>
<td>0</td>
<td>16</td>
<td>10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>countries</td>
<td>22</td>
<td>15</td>
<td>15</td>
<td>9</td>
<td>13</td>
<td>5</td>
<td>12</td>
<td>3</td>
<td>4</td>
<td>8</td>
<td>10</td>
<td>6</td>
<td>16</td>
<td>17</td>
<td>6</td>
<td>8</td>
<td>9</td>
<td>4</td>
<td>4</td>
<td>105</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>decade</td>
<td>15</td>
<td>12</td>
<td>10</td>
<td>7</td>
<td>24</td>
<td>11</td>
<td>22</td>
<td>10</td>
<td>11</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>7</td>
<td>0</td>
<td>3</td>
<td>111</td>
<td>8</td>
<td>5</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>level</td>
<td>14</td>
<td>18</td>
<td>18</td>
<td>16</td>
<td>5</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>12</td>
<td>10</td>
<td>7</td>
<td>4</td>
<td>11</td>
<td>12</td>
<td>10</td>
<td>4</td>
<td>10</td>
<td>4</td>
<td>8</td>
<td>63</td>
<td>12</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>support</td>
<td>12</td>
<td>26</td>
<td>26</td>
<td>12</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>13</td>
<td>13</td>
<td>6</td>
<td>0</td>
<td>9</td>
<td>8</td>
<td>6</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>6</td>
<td>5</td>
<td>12</td>
<td>52</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>sustainability</td>
<td>16</td>
<td>33</td>
<td>32</td>
<td>8</td>
<td>21</td>
<td>9</td>
<td>20</td>
<td>8</td>
<td>7</td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>10</td>
<td>3</td>
<td>4</td>
<td>78</td>
<td>3</td>
</tr>
<tr>
<td>real</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>10</td>
<td>5</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>11</td>
<td>10</td>
<td>8</td>
<td>2</td>
<td>8</td>
<td>5</td>
<td>11</td>
<td>8</td>
<td>14</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>10</td>
<td>3</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>time</td>
<td>15</td>
<td>8</td>
<td>8</td>
<td>11</td>
<td>4</td>
<td>14</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>8</td>
<td>2</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>17</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>example</td>
<td>18</td>
<td>12</td>
<td>12</td>
<td>6</td>
<td>16</td>
<td>12</td>
<td>13</td>
<td>11</td>
<td>7</td>
<td>6</td>
<td>4</td>
<td>12</td>
<td>8</td>
<td>7</td>
<td>1</td>
<td>5</td>
<td>11</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>8</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>role</td>
<td>23</td>
<td>16</td>
<td>16</td>
<td>11</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>2</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>5</td>
<td>9</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>7</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>government</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>1</td>
<td>12</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>8</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>8</td>
<td>5</td>
<td>2</td>
<td>10</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>international</td>
<td>18</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>3</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>12</td>
<td>2</td>
<td>9</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>doing</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>14</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>quality</td>
<td>11</td>
<td>13</td>
<td>13</td>
<td>17</td>
<td>6</td>
<td>8</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>14</td>
<td>7</td>
<td>15</td>
<td>6</td>
<td>10</td>
<td>5</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>question</td>
<td>20</td>
<td>12</td>
<td>12</td>
<td>2</td>
<td>14</td>
<td>3</td>
<td>13</td>
<td>14</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>7</td>
<td>8</td>
<td>0</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>organization</td>
<td>13</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>involved</td>
<td>20</td>
<td>3</td>
<td>3</td>
<td>10</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>9</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>things</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>4</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>10</td>
<td>4</td>
<td>9</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>focus</td>
<td>10</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>5</td>
<td>9</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>3</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>need</td>
<td>12</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>9</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>country</td>
<td>12</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>1</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Australia</td>
<td>12</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>important</td>
<td>11</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>7</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>year</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>7</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>change</td>
<td>3</td>
<td>8</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>policy</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>11</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>money</td>
<td>3</td>
<td>7</td>
<td>7</td>
<td>1</td>
<td>7</td>
<td>5</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>able</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>
Appendix 10. Organizational Case Study

The concept for ENSI was seeded at the Organization for Economic and Cooperative Development (OECD) Conference of Ministers of Member States in 1985 when a project proposal was discussed which included the linking of schools, school communities, research institutions and the government to dynamic and creative delivery of environmental education and organizational skill development (Posch, 1990). The OECD is an international forum through which the governments of over 30 international market economies come together to address the opportunities and challenges of globalisation from economic, social and governance perspectives (Lupele, 2007). ENSI was established as an international organization commencing in Europe in 1986 and was quickly disseminated through the drive of the OECD as an international, government-based research network focused upon policy, practice and research (Smith, 2004; OECD, 2005). ENSI remains in operation in 2014, albeit, under a differing governance structure than it was conceived, as will be discussed in the following section.

ENSI differentiates itself from other networks (e.g. Foundation of Environmental Education, FEE) through the effective development of partnerships that span across multiple levels of education including educational practitioners, teacher educators, research institutions, schools, school authorities, and policy makers at local and national government levels (Tilbury and Wortman, 2004). ENSI was selected as a case study due to its operation as a decentralised global network with over twenty-five years of rich history as a facilitator of EfS, manager of a multifaceted and geographically diverse organizational structure and network, and its significant repertoire of projects both under delivery and closed out. In addition, Australia had full membership of the ENSI Network until 2013. The ENSI Annual General Meeting was held in Australia in 2005 and Australia remains an associate member. The Country’s legacy of involvement in ENSI has provided an opportunity to connect deeply with the organization as a researcher and be invited to interact with the network as a representative of a member country including attendance at an annual general meeting in Switzerland in 2008 and meetings with Australian and international country convenors. Table 48 summarises ENSI’s key milestones, deliverables and outcomes.
## Table 48. Summary of ENSI’s Milestones

<table>
<thead>
<tr>
<th>Milestones</th>
<th>Deliverables</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commences facilitation of EfS as a decentralised network under the auspice of the OECD in 1986.</td>
<td>Facilitation of EfS through initiating, co-ordinating and supporting research and school development activities. Action research - participation and change beyond behavioural change. Promoting international exchange between organizations and programs. Academic and practical (i.e. teacher resource) publications. Policy research and recommendations.</td>
<td>Delivered eleven major projects and consultancies since 1986 representing millions of Pounds (€) in funding. Involved as a critical friend and/or project partner in many other projects. Presented at over 300 conferences and published in excess of 150 EfS documents and published research papers.</td>
</tr>
<tr>
<td>25 country members by 2004.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commences new partnership with UNESCO as the DESD commences in 2005.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decline in fee-paying membership and project funding from 2006.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transitioned governance structure to a combination of decentralised network and INPA in 2009.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Overview

ENSI defines itself through the application of the pedagogical approach of constructivism coupled with the research approach of action research. ENSI promotes as its key deliverables: environmental awareness; student-centred learning; and, changes to student-community/school-community relationships underpinned by the development of research outputs that further knowledge of EfS and whole-school sustainability programs (Posch, 1990; Henderson and Tilbury, 2004; Stevenson, 2007). As indicated in the previous sections ENSI was established under the auspices of OECD as a network aligned with various government levels. Participating countries at this time included Austria, Belgium, Canada, Denmark, Finland, Germany, Italy, Norway, Portugal, Sweden, Switzerland, and the United Kingdom. Ten more countries, including Australia and the United States, had joined by the end of 1994. It was also in 1994 that ENSI progressed from being a ‘project’ to a decentralised network in its own right. From 1986 until 2001, ENSI operated under the umbrella of the OECD Centre for Educational Research and Innovation, CERI (Smith, 2004). After 2001, ENSI was no longer closely linked to OECD and by 2004 had become entirely independent which represented an opportunity for it to
establish itself as a strictly independent organization (Lupele, 2007). ENSI transitioned to operation as an INPA in September, 2009 (ENSI, 2009) coupled, but distinct from its maintenance of a decentralised network structure. ENSI’s majority of active members are, and have always been, located within the European Union. Recently (i.e. 2008-2013), ENSI has operated as two bodies; ENSI INPA, the officially constituted corporate body under which it is internationally registered as a not-for-profit; and, the ENSI decentralised network, its operational and project delivery mechanism. Under their current structure the ENSI INPA is the only operating body.

In essence, ENSI is a ‘learning organization whose approach is based on systematic reflection on practice and well-researched learning processes’ viewing the school as a site for learning that eventually influences the wider community to pursue sustainable development (Lupele, 2007). One means for isolating the scope of a decentralised, global network is to identify the role it plays, operational aims and its core objectives. As indicated by Smith (2004), ENSI plays a leading role in the international analysis of EfS as opposed to environmental education and involves itself in the coordination and dissemination of research outcomes in member’s countries across the globe. ENSI also attempts to influence the curricula for EfS at a departmental and government level. ENSI’s operational aims include: i) to create stable learning networks, which link schools, families, community and workplaces; ii) generate local knowledge and meaningful discourses concerning sustainable development to meet personal, social and economic needs within communities; and, iii) foster the democratic participation of students as active citizens in shaping the environmental conditions of their life and work (Smith, 2004; ENSI, 2006). Operational objectives include i) starting up, coordinating and supporting research and school development initiatives; ii) preparing publications with a view to inform the public about and propagate the aforementioned themes and activities; iii) promoting international exchanges and acquiring insights and knowledge, setting up forms of cooperation, including with other international organizations and programs; and, iv) preparing and providing policy recommendations and other advice, either or not solicited (Smith, 2004; ENSI, 2009). The table below identifies the key principles and focal areas of ENSI. Regardless of ENSI’s shift in governance structure these remain true.
<table>
<thead>
<tr>
<th>Principle</th>
<th>Focal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>The nexus between teaching and learning.</td>
<td>ENSI endorses:</td>
</tr>
<tr>
<td></td>
<td>• Students increasing their control in determining the nature and content of their learning experiences;</td>
</tr>
<tr>
<td></td>
<td>• The shift from authority based to negotiated experiences;</td>
</tr>
<tr>
<td></td>
<td>• The use of content (knowledge or ideas) as resources for reflecting about personal experiences of the environment and for undertaking intelligent and responsible action towards it; and,</td>
</tr>
<tr>
<td></td>
<td>• The shift from institutionally based monitoring/assessment of learning experiences to personal self-monitoring or assessment on reflection and feedback from the community.</td>
</tr>
</tbody>
</table>

| The importance of school-community co-relations. | ENSI supports: |
| | • A shift away from the classroom as a learning site towards the community as a learning site; |
| | • Use of the school as a learning resource for the community, and the community as a learning resource for the school; and, |
| | • Development of a flexible and dynamic curriculum for all students which focuses upon sustainable development in the local environment, and is responsive to both the need for students to make sense of their personal experience in the world outside school and to the social and economic needs begin voiced within the local community. |

| The use of research as an integral part of development. | ENSI advocates: |
| | • The treatment of development activities as experiments to be tested through gathering perspectives of a range and variety of participants involved in the development process within the community; |
| | • Addressing research questions initiated by the parties involved in the development process; |
| | • Involving the participants in constructing public accounts of their work at the local level; |
| | • Constructing reflective accounts of the development process as it operates; and, |
| | • Participating in the production of comparative studies of the development process in different local and national contexts, as a means of stimulating public debate. |

(Adapted from Smith, 2004, p. 4 and Lupele, 2007, p. 155)
Deliverables and Key Programs

Although ENSI’s primary focal areas, roles, principles, operational aims and objectives have not wavered since inception, it’s organizational governance and the scale at which it both delivers and seeds delivery of programs has evolved significantly since its inception twenty-eight years ago. ENSI has managed to both scale up and out its delivery of programs though regionalisation/decentralisation, deliberate project development and management, and organic, adopted (e.g. member countries commencing their own programs built on ENSI projects) project delivery.

Upon detailed review of ENSI’s project, strategic and annual reports (ENSI Annual Reports, 2005 to 2012) and evidence provided by key informants and literature (e.g. Smith 2004 and key informants), the researcher has identified that ENSI has transitioned through four distinct phases of organizational development, growth and governance between its inception in 1986 and its current form at the conclusion of the DESD in 2014. These phases build upon previous research conducted by Smith (2004) and Lupele (2007) and are illustrated as ‘Waves of Development’ in Section 5.5.1, Table 31.

Each of the ENSI waves was affected by different drivers and demonstrated unique characteristics. The first wave was characterized by project specific teaching, academic research and recruitment of member countries. ENSI was establishing itself and needed to legitimise its standing as a facilitator of EfS. The second wave witnessed the consolidation of ENSI around the use of action research to facilitate EfS and the expansion of services to include policy recommendations and national level EfS evaluation projects. This wave was focused upon delivering new projects in conjunction with members and ensuring enduring value. In the third wave the OECD became ENSI’s ‘umbrella organization’ expanding its involvement with ENSI beyond simply the auspices organization. ENSI expanded both geographically and organizationally within the countries in which it delivered projects (i.e. 25 countries) and implemented a more robust network model utilising online communications to link its network to research and project delivery. This more mature example of decentralisation provides more autonomy to countries to deliver projects in association with ENSI (e.g. country coordinators and academic representatives were appointed). In 2005, the DESD commenced and this coincided with ENSI entering a fourth wave. It is worth noting that the fourth wave has occurred under a different organizational structure then the previous three waves. By 2003, ENSI was scaling back its focus on the proliferation of action research projects and
was both applying for and garnering the majority of funding from large-scale, research oriented projects with strong economic connections to the European Union. In parallel, ENSI has been a member of the expert group of CERI/OECD research on innovative learning environments and national/international institutions driven by policy objectives. This type of project necessitated a refined organizational strategy and ENSI embarked upon the process of examining and re-aligning its strategy to suit both the new operating structure and global landscape as will be discussed further below. The wave brought both increased opportunities for project delivery due to the international focus upon EfS spawned by the DESD; however, it also resulted in increased competition for projects from other organizations (e.g. FEE) and a focus by members upon developing their own, national agendas and programs to meet the objectives of the UN-DESD. This would lead ENSI to both expand and then enter a period of decline and consolidation as the UN-DESD progressed.

In 2005, ENSI prepared a Five Year Strategic Plan and embarked upon an increasingly active campaign of regionalisation/decentralisation increasing further geographic scale, and subsequently, requirement for increased organizational scale. In 2004, the OECD/CERI had suspended its system of working with decentralised secretariats as characterized by ENSI and, therefore, ENSI was in the process of soliciting a new ‘umbrella organization’ in which to align its work (ENSI, 2005). ENSI attempted to secure UNESCO as its umbrella partner in the first year of the UN-DESD which would have marked a new way forward for ENSI coinciding with the commencement of the UN-DESD and implementation of their strategic plan. However, ENSI was not able to secure this organizational relationship with UNESCO in full and, therefore, shifted laterally to an independent network structure with its own constitution. The independent network is funded by members/member states, the country hosting ENSI’s Secretariat, and multinational projects initiated by ENSI in the frame of the European Unions’ educational programs.

As indicated, in the strategic plan ‘after 20 years of innovation and action research in the field of environmental education, the demand to ‘go public’, to extend our outreach to both educators and to policy shapers has never been greater’ (ENSI, 2005:3). The Strategic Plan provided what ENSI considered the necessary elements required to structure the coming years for the organization and work effectively in the framework of the UN-DESD. It included a refined vision and approach, overview of partnerships both present and planned, action planning, and ongoing outcome review/evaluation process.
As a component of the strategic planning process, ENSI re-scoped its vision and aligned its organizational strategy to this vision (ENSI, 2005:15).

In all nations, students participate as active citizens in shaping the sustainable conditions of their life and work.

The vision clearly demonstrates ENSI’s focus upon an expansion in geographical and organizational scale to encompass ‘all nations’ partnering in regional frameworks and alliances to deliver organizational objectives on a global basis. Of the goals set under the direction of this vision, goal six seems most applicable to this research in its recognition that regionalisation and the effective participation at all levels will ensure that ENSI becomes a credible global organization in its own right (ENSI, 2005). This goal set in motion a series of defining circumstances of which have had an immense impact upon the ensuing years of ENSI until the present day.

Observations and Discussion

During the years between 1986 and 2005, ENSI grew to be a prominent, global network (Myllari, Ahlberg, and Dillon, 2009). As previously indicated a five year strategic plan was developed in 2005, ratified by the Executive at the Annual General Meeting (AGM), and prepared for implementation commencing in 2006. In 2006, ENSI would celebrate its twentieth Year Anniversary and the organization was moving from success to success and in accordance with their strategic goals. It was clear that ENSI was structuring itself as a ‘truly global organization’ (ENSI, 2005:6). In 2005, at the commencement of ENSI’s fourth wave, the ENSI organization witnessed a period of growth and international exposure. It was a remarkable year for ENSI – a year of new partnerships and change. The cornerstone of ENSI’s work was the UNECE strategy on Education for Sustainable Development and other regional strategies to implement ESD. This resulted in new Institutional partnerships for ENSI and new challenges at international, regional and national level (ENSI, 2005). ENSI had identified that the single most important organizational element was to ensure that it was operating an organization that is identified by stakeholders as very good at doing the things that matter most to the industry/sector in which it is operating (ENSI, 2005). For ENSI, this means providing continuously good services as a facilitator of EfS and the maintenance of funding streams from membership and respective grants systems. The attraction of new projects such as SEED (Schools Development through Environmental Education 2002 - 2005), CSCT (Curriculum, Sustainable Development, Competences on Teacher training,
2006 - 2009), SUPPORT Partnership and Participation for a sustainable tomorrow 2008-2011), CoDeS (Collaboration of schools and Communities for Sustainable Development 2011-2014) – all funded by grants of EU’s educational programme COMENIUS – and the Carpathian Sustainable Learning Network (funded by ENSI and UNEP) during the period from 2006 to 2012 is evidence that ENSI has still been valued by its members and funders enough to continue to delivery projects. ENSI Annual Reports (i.e. years 2005-2012) have demonstrated universally the key performance indicators of the organization as membership, funding and projects. These have been highlighted year after year as pivotal factors in the success of ENSI. However, conversely, ENSI perceived one of its most significant weaknesses to be its European dominance and lack of regional structure in, for example, the Asia-Pacific and India (ENSI, 2005). One of ENSI’s key strategic priorities was to extend its membership base to include countries around the world and an effective partnership with the UN-DESD and its governing organization, UNESCO, was envisioned as a core aspect of the strategy. The ENSI Executive agreed that regionalisation and further decentralisation of the organization needed to be managed carefully; however, agreed to investigate further and plan for further expansion of the network. In April 2005 ENSI had launched a new website in preparation for the implementation of a new strategic plan and with the goal of providing further scope for scaling up and out the network through electronic means. The implementation and funding of a long-term secretariat position was also agreed upon and this position was immediately filled paving the way for a more stable secretariat with expanded resources in which to manage the network.

It is clear from more recent Annual Reports (i.e. 2009, 2010, 2011, and 2012) that ENSI maintained a strong focus upon the European Region as the majority of projects, partners, members and funding opportunities remained there. However, ENSI continued to strengthen their partnerships in the Asia-Pacific region and made every attempt to deliver key strategic goals and actions through partnerships within countries/regions outside of Europe. As identified in the ENSI 2012 Annual Report a significant structural challenge had presented itself by the end of the year driven by a marked reduction in new and continuing membership, project funding availability and ENSI’s attraction/retention of funding sources, and the volume of projects commenced and/or extended. Membership fees, for example, no longer covered the administrative costs required to ensure that secretariat services can be provided to the organization to ensure day to day operations are ongoing (ENSI, 2012). These realisations presented the most significant challenge to
the ongoing viability of ENSI faced in its history. ENSI was attempting to address these challenges and, for example, had commenced trialling a ‘fee for service’ model whereby, the organization provided research and/or project management services in return for a set fee. The fee for service model is viewed as necessary to ensure the ongoing financial viability of the organization.

ENSI’s detailed action plans, which formed a component of their 2006-2010 Strategic Plan, were generally focused upon consolidation of the organizations governance structure and geographical expansion of its membership and partnership base. ENSI went so far as to align its organizations strategies to the those of the UN-DESD Implementation Scheme to ensure that the kind of tasks and actions ENSI pursued throughout the UN-DESD met requirements for organizational and project-specific contributions to the objectives of the UN-DESD. ENSI tied itself strategically to the UN-DESD otherwise tethering the success of its strategic plan, or lack thereof, to the progress made throughout the Decade. To some degree they have been successful in expanding their initial membership and programs, however, more recent indications are that the organization has stagnated and is in a state of decline and attempted consolidation.
### Appendix 11. Key Program Documents

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Publisher</th>
<th>Publication Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Program: Learnscapes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Dynamics of an online knowledge building community: A 5-year longitudinal study</td>
<td>J. Myallari, M. Ahlberg and P. Dillon/British Journal of Educational Technology</td>
<td>2009</td>
</tr>
<tr>
<td>School grounds as sites for learning: Making the most of environmental opportunities</td>
<td>Malone and Tranter in <em>Environmental Education Research</em></td>
<td>2003</td>
</tr>
<tr>
<td>Learnscapes</td>
<td>S. Smith/SASTA Journal</td>
<td>2001</td>
</tr>
<tr>
<td>Hands On Learnscaping</td>
<td>Tyas-Tunggal self-published</td>
<td>1997</td>
</tr>
<tr>
<td><strong>Program: Quality Criteria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creating learning environments for the future: Research and practice on sharing knowledge on ESD</td>
<td>J. Tschapka and M. Reti/ENSI inpa</td>
<td>2012</td>
</tr>
<tr>
<td>Educating Space: National and cultural differences in the process and with quality criteria of school building programmes</td>
<td>M. Reti and E. Lippai/Unknown if published</td>
<td>2011</td>
</tr>
<tr>
<td>Quality systems’ for Sustainable Education as tools for quality enhancement and participation.</td>
<td>M. Mayer/University Roma TRE, School for Advanced Secondary Teacher Education</td>
<td>2006</td>
</tr>
<tr>
<td>Title</td>
<td>Author(s)</td>
<td>Year</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Quality Criteria for ESD-Schools: Guidelines to enhance the quality</td>
<td>S. Breiting, M. Mayer, and F. Mogensen/Austrian Federal Ministry of</td>
<td>2005</td>
</tr>
<tr>
<td>of Education for Sustainable Development</td>
<td>Education, Science and Culture</td>
<td></td>
</tr>
<tr>
<td>Quality Criteria for ESD schools: ENSI International Network</td>
<td>M. Mayer, and F. Mogensen/Unkown if published</td>
<td>2005</td>
</tr>
<tr>
<td><strong>Program: CoDeS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaboration of schools and communities for sustainable development</td>
<td>Education, Audiovisual and Culture Executive Agency</td>
<td>2014</td>
</tr>
<tr>
<td>(CoDeS) Program Report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School and Community Collaboration for Sustainable Development:</td>
<td>Comenius</td>
<td>2014</td>
</tr>
<tr>
<td>Materials for You</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communities for Sustainable Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CoDeS Website: [<a href="http://www.comenius-codes.eu/">http://www.comenius-codes.eu/</a>](<a href="http://www.comenius-">http://www.comenius-</a></td>
<td>Education and Culture DG and Comenius</td>
<td>On-going</td>
</tr>
<tr>
<td>codes.eu/</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Program: SUPPORT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a sustainable tomorrow (R. Margoluis et al.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partnership and Participation for a Sustainable Tomorrow: External</td>
<td>M. Mayer/Education and Culture DG</td>
<td>2010</td>
</tr>
<tr>
<td>Evaluation of the SUPPORT Project</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review from the project leader Astrid Sandås</td>
<td>A. Sandas</td>
<td>2010</td>
</tr>
<tr>
<td>Collaboration and Education for Sustainable Development</td>
<td>K. Czippan, A. Varga, and F. Benedict</td>
<td>2010</td>
</tr>
<tr>
<td>Biodiversity in Education for Sustainable Development: Reflection on</td>
<td>K. Ulbrich, J. Settele and F. Benedict (Ed.)/Pensoft</td>
<td>2010</td>
</tr>
<tr>
<td>School-Research Cooperation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2NNECT: ICT tools to facilitate partnerships for ESD</td>
<td>R. Mathar and SUPPORT Project Team/Education and Culture DG</td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Program: CO2NNECT</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Appendix 12. Phase 2 - Program Interviews

<table>
<thead>
<tr>
<th>Project</th>
<th>Interviewee</th>
<th>Date</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENSI Executive</td>
<td>Interviewee 10</td>
<td>Sept. 2012</td>
<td>25 mins</td>
</tr>
<tr>
<td>ENSI Country Coordinator</td>
<td>Interviewee 11</td>
<td>Sept. 2012</td>
<td>23 mins</td>
</tr>
<tr>
<td>EfS Coordinator/Project Manager</td>
<td>Interviewee 12</td>
<td>Sept. 2012</td>
<td>27 mins</td>
</tr>
<tr>
<td>ENSI Project Manager</td>
<td>Interviewee 13</td>
<td>Sept. 2012</td>
<td>20 mins</td>
</tr>
<tr>
<td>ENSI Project Manager</td>
<td>Interviewee 14</td>
<td>Sept. 2012</td>
<td>24 mins</td>
</tr>
<tr>
<td>ENSI Pedagogical Coordinator</td>
<td>Interviewee 15</td>
<td>Sept. 2012</td>
<td>26 mins</td>
</tr>
<tr>
<td>ENSI Executive/Project Manager</td>
<td>Interviewee 16</td>
<td>Oct. 2012</td>
<td>37 mins</td>
</tr>
<tr>
<td>ENSI Project Manager</td>
<td>Interviewee 17</td>
<td>Feb. 2014</td>
<td>31 mins</td>
</tr>
</tbody>
</table>
Appendix 13. Program Case Studies

Program Case Study 1: Learnscapes

The Learnscapes Project aimed to promote the redesign of school grounds to permit school communities to interact with their environment and link their curriculum with their use of those school grounds (Smith, 2004). Learnscapes was introduced to ENSI through its application in 23 Australian schools during the mid-to-late 1990s as a trial program introduced by the New South Wales (NSW) Education Department (Smith, 2000). Table 50 summarises Learnscapes’s key features.

**Table 50. Summary of Learnscapes Key Features**

<table>
<thead>
<tr>
<th>Milestones</th>
<th>Deliverables</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learnscapes project expands from Australia to four European countries through ENSI in 1998.</td>
<td>Aims to promote the redesign of school grounds to permit school communities to interact with their environment.</td>
<td>Development of a connection between the school grounds and the community.</td>
</tr>
<tr>
<td></td>
<td>Link school curriculum to the physical school environment/grounds.</td>
<td>Sustainable land and building use curriculum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extension project implemented - LEARN (Learning Environments)</td>
</tr>
</tbody>
</table>

Overview

The origin of the Learnscapes concept dates back to a project known as ‘Learning Through Landscapes’ which began as a gardening program in Wiltshire, UK to help schools and early childhood centres make the most of their outdoor spaces for play and learning (Kenny, 1996; Malone & Tranter, 2003). The ‘Learning Through Landscapes’ philosophy is premised on the concept that school grounds are essential to children’s learning and development, providing opportunities for healthy exercise, creative play, making friends, learning through doing and getting in touch with the natural world (ENSI - [http://www.ensi.org/Projects/Former_Projects/Learnscapes/](http://www.ensi.org/Projects/Former_Projects/Learnscapes/)).

A Learnscapes is a place where a learning program has been designed to permit users to interact with an environment. It may be natural or built, interior or exterior and related to any learning area(s) that the school wishes to implement. The Learnscapes model is more than a ‘beautification project’. It encourages students, teachers and parents to help to map and orient the school grounds, marking in major features and names of well-known
landmarks and places. They then work together to prepare a plan for how they would like to enhance the quality of their school grounds developing priorities aligned to redesigning the space to permit children, teachers and their communities to interact with their environment. The space may be used for outdoor quiet places, where reading can take place; indigenous yarning circles to celebrate cultural diversity; or, to the plant forests for exploring bio-regional distinctions or herb- and vegetable gardens for personal use or the school kitchen. The main goal is to ensure that connection to the environment is facilitated through the space and that the wider school community is invited in to become active participants in the use and stewardship of the space.

Deliverables and Facilitation Methods

In 1998 the Learnscapes Project was implemented within the ENSI network with four countries (i.e. Austria, Norway, Finland and Germany) joining Australia in sharing ideas, outcomes, and cultural strategies in the re-development and re-purposing of school grounds. The initial concept for ‘Leanscaping’, prior to its formalisation as a project/program, was described as a state of readiness to adapt and change the school curriculum to utilise or develop the school grounds/site (Tyas-Tunggal, 1997).

ENSI’s participatory approach is typified by the Learnscapes project. The inclusion of teachers, teacher trainers, students and researchers in the delivery of the project exemplifies ENSI’s application of broad inclusion and use of action research (Brody and Hug, 2005). Action research is a reflective process whereby teachers study their challenges in a peer-structured setting in an attempt to evaluate decisions and actions regarding their practice and learning as educators. The purpose is to assist in bringing about change in particular contexts (Brody and Hug, 2005; McNiff and Whitehead, 2005; Parkin, 2009). Action research’s strength dwells in its focus on developing solutions to practical problems and the process of empowerment that practitioners are engaged in through research, development and implementation of activities that address the identified challenges (Meyer, 2000). In action research, ‘the researcher is central to the research, and the focus is on self-improvement’ (McNiff, Lomax, and Whitehead, 2003, p. 10). For example, through Learnscapes students and teachers actively participate in planning and developing learning environments. This collaborative and inclusive approach facilitates the long-term planning of their schools’ future. Teachers and researchers work together to document their activities and results and to collate their notes into formal experiences utilising systemic reflection of their professional practice to
develop case studies of best practice. Eventually, the teachers become the researchers (Brody and Hug, 2005).

The Learnscapes Project was eventually extended to include a focus on the effects of more wide ranging types of learning environments. ENSI eventually extended the project into a new project called LEARN (Learning Environments) and investigated ‘personal learning environments’ (e.g. Information and Communication Technology, ICT), emotional approaches (e.g. drama and arts), Learnscapes (i.e. ecologically shaped school grounds for personal experienced learning), learning in different social environments, in a multiple culture learning society (i.e. social learning), and global learning. Key objectives of the projects included exploring the concepts of learning environments on cultural backgrounds in the participating countries and the analysis of the effects on the concept of learning for a more sustainable society. This included the identification of success factors on the basis of a set of quality criteria for effective learning environments which built further on the Quality Criteria in ESD project identified in the following case study. Based on ENSI’s early work on Learnscapes the network has been the only international non-profit organization inducted as full participants in OECD/CERI’s expert group for research on Innovative Learning Environments (Communication with ENSI Secretariat, 2014).

Program Outcomes and Observations

ENSI’s Learnscapes project, although commencing in Australia and under Australian guidelines, was contextualised by other nations (i.e. Austria, Finland, Netherlands and Norway) educational systems at both local and national levels. This was an attempt to ensure that development of program materials and recommendations stemming from the projects delivery were appropriate for the region in which the program was implemented (Pfaffenwimmer and Smith, 2000). Australia boasted an extensive history of involvement in whole-school approaches to sustainability of which the Learnscapes program was one of the first to cater for the built environment, physical landscape and connection to the social environment which encompasses the school and school community (Ferreira, Ryan and Tilbury, 2006). Learnscapes in Australia, for example, was focused on permitting learners to interact with the environment as a component of their learning experience. However, when contextualised in other countries and through the ENSI interpretation the Learnscapes concept evolved beyond any an emphasis on school grounds to becoming increasingly ‘inclusive’ and ‘holistic’ (Ferreira, Ryan and Tilbury, 2006, p. 17). The
‘contextualisation’ of programs in ENSI member countries represents the application of vertical scale, scaling up organizationally and at the program level the ability to deliver effective EfS through program interpretation and recognition of difference in local and national program requirements.

In addition to the focus of Learnscapes upon a participatory approach through the application of action research, the ENSI Learnscapes project was designed to align with an existing project that had gained traction in other geographical regions (i.e. United Kingdom). To this end Learnscapes was scaled out (i.e. geographically) through ENSI and not as a direct result of ENSI. Learnscapes is a good example of being projects to scale as the strategies employed in the United Kingdom program have been re-contextualised and applied to program development and delivery at scale in the Asia-pacific and across Europe. Learnscapes strategies for introducing environmental education have been instrumental in developing international networks focused on the development of best practice and knowledge exchange (Tilbury and Wortman, 2004). The strong emphasis upon involving students, parents, the community and professionals/experts in the integrative and cross-curricular exploitation of schoolgrounds as a learning environment and built firmly into the school curriculum typifies the collaborative and democratic model expounded by ENSI and demonstrated in its projects.

However, it is worth noting that certain barriers to using Learnscapes in teaching were identified. For example, it was identified that some subjects (e.g. computer science, history and mathematics) were not suited to Learnscapes; that management of students outdoors was difficult; there wasn’t enough time to incorporate more teaching; outdoor learning wasn’t real learning; and, that some teachers were generally nervous about exiting the confines of the classroom to delivery curriculum (Skamp and Bergmann, 2010). However, most poignant was the indication that ‘a lack of priority was given to environmental education within the overall school curriculum’ (Skamp and Bergmann, 2010, p. 348). The success of ENSI’s Learnscapes program was through its ability to both shape policy and deliver practical projects that engaged teachers, students and researchers alike in active engagement with EfS. Learnscapes demonstrates a strong case for adoption at scale and the program has been successfully implemented in numerous more countries/regions since the project concluded (Malone & Tranter, 2003; Learning through Landscapes - http://www.ltl.org.uk/).
Program Case Study 2: SEED - Quality Criteria in ESD

Quality Criteria in ESD (Environmentally Sustainable Development) was a three year research project focusing on two parallel and highly interrelated issues. These issues were the conceptualisation of ESD and the use of quality criteria for school self-evaluation. Both of these issues respond to recent international challenges in ESD but can at the same time be seen as contributing to previously completed research work done within the framework of ENSI. The justification for the research project can, therefore, be viewed from both an internal and external perspective. Table 51 summarises Quality Criteria in ESD’s key features.

Table 51. Summary of Quality Criteria in ESD’s Key Features

<table>
<thead>
<tr>
<th>Milestones</th>
<th>Deliverables</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Quality Criteria (QC) project was initially delivered as a component of the SEED - School Development through Environmental Education project which concluded in 2005. QC resulted in the publication of a Booklet in 2005 based on the full report on research on school quality: “Trends and divergences” (Mayer &amp; Mogensen 2005).</td>
<td>A comparative study of the contribution to school development offered by EE and EfS. Development of a virtual network in which to facilitate discussion and exchange information amongst project participants</td>
<td>Conceptualisation of EfS. The use of Quality Criteria for school self-evaluation. Quality Criteria for ESD Schools booklet.</td>
</tr>
</tbody>
</table>

Overview

The researchers identified that a deeper understanding of ESD was still unclear and unfamiliar to many, both on the level of theory as well as the level of practice. A central task of this project became the exploration of the inter-relationship and value of the environmental, social and economic ‘pillars’ of ESD as observed from within differing cultural contexts. A great deal of ENSI’s focus leading into this project emphasised work related to developing quality criteria for ESD in a school development context. This project has further extended this research and simultaneously has put focus on the issue of evaluation as a significant means for ‘quality enhancement’ and for a kind of evaluation that supports and steers change and development at the school level.
Embedded in this view is recognising evaluation as an intrinsic part of an Environmental Education (EE) and ESD program. Therefore, from an internal ENSI perspective the project will, by addressing the above-mentioned issues, qualify and add value to the overall philosophy and vision of ENSI by promoting and facilitating sustainable development and action within educational systems. The chief aim of which is to foster the democratic participation of students as active citizens in shaping the sustainable conditions of their life and work.

**Deliverables and Facilitation Methods**

The justification for the research project was to strengthen ENSI’s relationships with UNESCO and in the process become a key contributor to the framework of the UN-DESD. It is a strategically relevant choice to focus on the conceptualisation of ESD and on evaluation as key issues in the DESD if ENSI is to act as a significant and important partner for UNESCO. Key objectives for this project include (ENSI, 2005):

1. to contribute to the development of a coherent, culturally sensitive and transformative concept of ESD;
2. to compare on an ongoing basis the development of ESD concepts with the developments of evaluation tools such as Quality criteria or indicators;
3. to monitor the dissemination of the already produced Quality Criteria booklet in the different ENSI member countries;
4. to analyse and compare the different strategies used from different countries for the dissemination of the Quality Criteria booklet;
5. to analyse and compare quality certification systems in different countries (the procedural system) and of existing training courses for evaluation competencies; and,
6. to develop training courses for building up competencies for the use of QC in self-evaluation, peer evaluation and external evaluation.

The project utilized the ENSI-website as a platform to form a virtual network in which to facilitate discussion and exchange information amongst project participants. The outcomes of the project included the preparation and dissemination of a Quality Criteria Booklet, internet-based survey, training courses, and translated research materials into more than twenty-one languages (ENSI, 2008).
Program Outcomes and Observations

The Quality Criteria in ESD project identified three processes of appropriate EfS learning. These included projects that are students centred, collaborative and participative. Quality criteria offers a starting point for dialogue focused on EfS intended on engaging as many of the key stakeholders as practicable (Breiting et al., 2005). It was an important aspect of the project to stress that quality was an orientation and not a set of defined rules to be followed. The project collected wide-ranging evidence for where quality criteria could be considered grounded in schools and examples of it observed in practice, but encouraged contextually specific criteria be prepared inspired by a common framework (Interviewee #14).

The work examining quality criteria is underpinned by an evolving understanding that sustainable development is a matter of democratic citizenship. It makes a contribution to the study of EfS by mapping out the collaborative process, whole of systems thinking, and encouraging visible outcomes (Breiting, Mayer, Mogensen, & School, 2005).

The first step in general was to ask people to reflect on what they considered the more important quality of their own work. Why they considered they're work is good, what he or she thinks if they will look around in a school at environmental education in general (Interviewee #14).

An output of the project was the Quality Criteria in ESD book titled ‘Trends and Divergences’, designed to reflect on the learnings the researchers had collected in order to identify what were the main issues and the possible future development in quality criteria (Interviewee #14). The book was designed to be practical in that it could be used by teachers, teacher trainers, and the community. This is one of the projects perceived strengths; that its practical outcome was a resource that could be applied by numerous stakeholders and across contexts. Although, the book represented the condensed output of the research conducted throughout the project and was not an EfS facilitation method in and of itself, EfS facilitation methods were applied throughout the project in, for example, group activities and presentation (i.e. workshops) with key stakeholders. A web survey was eventually provided in 2009 to follow-up the use of the book in different countries. Although, the survey was not able to capture how the criteria was applied at, for example, the school level it was timely in that it captured not only the regionally-based, practical application of the book in the years since it was published but also
reflections on the impact that the quality criteria identified had on the transition from environmental education to EfS in school systems internationally.

**Program Case Study 3: CoDeS**

The Collaboration of Schools and Communities for Sustainable Development (CoDeS) project examines inquiry-based science learning with the overarching goals being to improve students’ motivation, deepen knowledge in science and develop civic competencies (ENSI, n.d.-a). Table 52 summarises CoDeS key features.

**Table 52. Summary of CoDeS Key Features**

<table>
<thead>
<tr>
<th>Milestones</th>
<th>Deliverables</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progress, final and external evaluation reports.</td>
<td>Identification of socio-cultural implications of collaborative and multi-disciplinary interaction.</td>
<td>Toolbox to support project partners.</td>
</tr>
<tr>
<td></td>
<td>Analyses of 46 exemplar cases of school-community collaboration.</td>
<td>Travelling guide for the reflective practitioner.</td>
</tr>
<tr>
<td></td>
<td>Toolbox to support project partners.</td>
<td>Teacher training sessions.</td>
</tr>
</tbody>
</table>

**Overview**

‘CoDeS is a Comenius multilateral Network funded by the Lifelong Learning Program from the European Union (EU) that focuses on school community collaboration addressing sustainability. The activities of the network aim at providing an European perspective on the processes of learning, models, values and tools for successful collaboration’ (Comenius, n.d.-a). The project is designed to identify exemplar cases of school-community collaboration to reveal the various features of such programs relevant to successful implementation.

CoDeS intends on identifying the socio-cultural implications of collaborative and multi-disciplinary interaction and the competencies of key actors required to address the complexities inherent to the above. The projects target groups include school teachers,
principals, educational institutes, teacher trainers, local communities and community members. These target groups have been assembled in a decentralised network via a ‘consortium’ of actors engaged in projects focused upon the facilitation of sustainable development at the school-community interface. The CoDeS project employs qualitative research methods to the study of social learning theory in an attempt to craft a theoretical framework for what effective school-community collaboration should exemplify.

**Deliverables and Facilitation Methods**

CoDeS intended deliverables include the development of models, indicators and tools to support and enhance the quality of school-community collaborative efforts as described in the previous section. A wide range of partners have been engaged through a survey focusing on exemplar cases of collaboration with the chief aim being to uncover the features associated with successful collaborative models and implementation. The survey analysis is intended to lend itself to the development of a descriptive narrative intending to form the basis for developing a theoretical model of collaboration from a European perspective (Comenius, n.d.-b).

The Project is intended to both conduct research into collaborative practices and to facilitate these very practices through the adoption of an existing e-platform (Comenius, n.d.-c). The project culminates in the development of a toolbox inclusive of worksheets, checklists, a digital handbook for local authorities, and the publishing of a book entitled ‘Travelling Guide for the Reflective Practitioner’ intended to provide a detailed account of the models, indicators and conditions required for conducting collaborative processes intended to facilitate effective sustainable development and the actions required to strengthen the nexus at which the school-community interact. Project results will be widely disseminated through conference presentations, study visits, roundtables, and teacher training seminars.

**Program Outcomes and Observations**

The CoDeS project commenced on a strong footing having partnered in 2011 with 29 organizations spanning 17 countries including a partner from Asia (Tschapka and Reti, 2012). In September 2014, as the project was concluding, CoDeS had involved over 300 participants through conferences; had over 20,000 website hits; engaged 435 school-based projects; and, produced both teacher resources (e.g. Travelling Guide and Toolbox) and research reports (e.g. Isolated Community Integration Profiles). A key aspect of the
CoDeS project was the identification, harvesting and exploitation of existing networks. The development of a ‘consortium’ encompassing international (e.g. OECD and UNECE) national (e.g. Ministries), and regional level (e.g. municipalities and schools) participants increased the reach of the project and made use of well-established, decentralised networks already in existence. The CoDeS project focused upon a multifaceted approach to the investigation of collaboration including: a) models and schemes of collaboration; b) conditions and indicators of process; and, c) tools for concrete steps (Comenius, n.d.-c).

As indicated in the CoDeS Progress Report (Comenius Multilateral Network, 2013), the ‘European financial crisis had a significant impact on national policies for ESD and on CoDeS partners. Partners found challenges in engaging fully with the project and this affected the dissemination of material. Active networking among partners was a crucial success factor and was challenged by the macro-financial circumstances under which it was being delivered in Europe.

**Program Case Study 4: SUPPORT**

The goal of the Partnership and Participation for a Sustainable Future Tomorrow (SUPPORT-) project was to promote and enhance the quality of EfS by linking schools, research institutions and communities together through the application of a web-based network (SUPPORT, n.d.-a). Table 53 summarises SUPPORT’s key features.

**Table 53. Summary of SUPPORT’s Key Features**

<table>
<thead>
<tr>
<th>Milestones</th>
<th>Deliverables</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial and logistical support provided by European Commission Lifelong Learning Program. Program commenced in 2007 and concluded 2010. Thirty-one partner organizations from fifteen European and two Asian countries joined the project as network members.</td>
<td>Enhancement of sustainable development knowledge through network development and collaboration. Fostering school-school and school-research collaboration via an online, web-based tool.</td>
<td>Four booklets focused on biodiversity, collaboration and the use of ICT in the facilitation of EfS. Development of a web-based network. Co2nnect website used by 644 schools representing 31,815 students.</td>
</tr>
</tbody>
</table>
Overview

SUPPORT aimed to accomplish the above-mentioned goal by developing knowledge about the potential barriers and constraints to implementing EfS at international policy, national administration, teacher training, school administration, teacher and student scales through the application of a networked approach. It was supported financially and logistically by European Commission Lifelong Learning Programme.

ENSI identified a perceived gap between the development of policy and its practical application and launched SUPPORT to address this gap. SUPPORT was focused on the enhancement of sustainable development knowledge through four key methods: 1) through schools collaborating directly with other schools; 2) schools collaborating with local communities; 3) schools collaborating with research institutions; and, 4) the facilitation of the collaboration process through the implementation of ICT (e.g. online, web-based networks). Thirty-one partner organizations from fifteen European countries joined the project as network members and were connected through two websites (www.support-edu.org and www.co2nnect.org) designed to both manage the internal project workplan and connect teachers and students to the project respectively.

Deliverables and Facilitation Methods

The SUPPORT project approached EfS from the dual perspectives of partnerships and participation. Partners were supported through the implementation of a collaborative tool in the form of a web-based network. The network was augmented through partner meetings, conferences, workshops, reports as well as internal and external evaluation. Hard and soft copy booklets were produced at the conclusion of the project to capture the learnings identified. The four booklets focused on biodiversity, collaboration and the use of ICT in the facilitation of EfS.

The Co2nnect website, for example, was launched in March 2009 and at the conclusion of the project in October 2010 had been used by 644 schools representing 31,815 students whom had interacted with the website uploading CO$_2$-e emissions and transport data to share amongst the network. The CO2nnect tool facilitated such collaboration by creating a learning environment that fostered school-school and school-research collaboration via an online, web-based tool; and, provided the framework necessary for schools to construct local, science-based learning environments grounded in school-community collaboration (SUPPORT n.d.-b).
Program Outcomes and Observations

The SUPPORT project was formally evaluated by an independent, third party as a condition of its funding. Most significantly, perhaps, was that third party project evaluator’s identification in the report (Education, Audiovisual and Culture Executive Agency, 2010, p. 3) that:

The SUPPORT network's activities were in accordance with the original application, with evidence of high quality contributions and additional results that all bring significant and quantifiable contribution to several areas in Comenius Programme, to LLP objectives and to the EU policies.

The reach and impact of the project’s activities was outstanding...

The breath and width of the impact of the project in terms of geographical reach (e.g. 17 languages and 30 countries) and organizational structure (e.g. 644 schools) appear to indicate that the application of a network approach in the delivery has assisted in introducing scale to the project.

The Project Manager indicated that as a coordinator of the Support network they had learnt that working together in a ‘European partnership is demanding, but also inspiring and rewarding’ (SUPPORT n.d.-b). The SUPPORT Project Evaluation Report and the Project Managers project review (SUPPORT n.d.-b) identified three key outcomes of the SUPPORT project through its delivery of the Co2nnect website:

1) Demonstration of innovative means of learning and associated learning mediums in support of producing diverse EfS learning outcomes;

2) Implementation of concrete EfS activities and education approaches in a broad range of schools internationally; and,

3) Development of a tool to support implementation of frameworks for long-term EfS programs in schools.

Cultural differences in the facilitation of EfS, such as language and working methods, were noted as a gradually emerging strength of the network approach leading to a more thorough understanding of the outcomes of collaborative opportunities and events (SUPPORT n.d.-b).

The research analysis conducted by the project reviewer during and after the project identified that learning outcomes measured throughout the project correlated to the intensity of collaboration that was facilitated between the partners (e.g. schools and
organizations outside of the school). In addition, outcomes relating to skills, aptitudes, attitudes and values tended to be more challenging to identify and obtain. However, these outcomes were more responsive to increasing or decreasing degrees of collaboration amongst partners than, for example, students understanding of complex issues and awareness-raising.
## Appendix 14. Organizational Survey Questions Analysis aligned to codes

<table>
<thead>
<tr>
<th>Survey question response</th>
<th>Relationship to codes</th>
<th>Results Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. To identify the strengths and weaknesses of projects.</td>
<td>Governance and Democracy</td>
<td>The response rating average for response option a) is 2.17 indicating that it was considered the most important aspect of program monitoring and evaluation. 42% of respondents ranked this response as the most important (ranking 1) and 67% ranked it as one of the top two response options. These results indicate clearly that identifying strengths and weaknesses for programs is of the most importance to survey respondents. In relation to the coded data this indicates a significant focus upon project governance and democracy highlighting respondents concern with projects both: 1. Containing process and people that can carry out goals and achieve project outcomes; and, 2. Ensuring the processes in place allow for collective and necessary decisions to be made. As indicated in the code manual, governance and democracy are considered to be mutually supportive constructs.</td>
</tr>
<tr>
<td>b. To provide feedback to key stakeholders (e.g. project participants, funders, academic community, etc.)</td>
<td>Governance</td>
<td>The response rating average for option b) is 2.92 representing 73% of respondents ranked this option second third or fourth in importance from the five options provided. These results indicate that governance is of importance to respondents, as evidenced in the results presented above; however, feedback to stakeholders is of less importance than the identification of project strengths and weaknesses. This result highlights the timescale in which feedback occurs in the monitoring and evaluation process which is usually after strengths</td>
</tr>
</tbody>
</table>
and weaknesses have been evaluated. It is logical that this response would be identified as important but less so than response a).

c. To identify the need for future programs and project areas.  

**Function**  
The response rating average for option c) is 3.42. 75% of respondents rated this response as the third or fourth important option of the five provided indicating that respondents did not consider the identification of future projects/project areas as a very significant aspect of monitoring and evaluation.

The results indicate that the function of a project as it relates to the internal and external factors and components comprising the project (e.g. structure and behaviours) were of little importance to the monitoring and evaluation process.

d. To provide for the further development of the EfSD body of knowledge in general.  

**Relevance**  
The response rating average for option d) is 3.83. 67% of respondents indicated this option was ranked as the fourth or fifth important from the five options provided. The results demonstrate that option d) is considered by respondents to be the least important reason to monitor and evaluate projects from the options provided.

The result indicates that respondents identified monitoring and evaluation of EfS projects as less important to establishing the relevance of project objectives. This indicates that understanding stakeholder’s drivers for contributing to a project is not considered highly relevant when compared to the other options provided.

e. To enable ongoing learning and improvement to the practice of EfSD.  

**Accountability and Networks**  
The response rating average for option e) is 2.67 indicating that respondents considered enabling ongoing learning and improvement to the practice of EfS as the second most important option. 58% of respondents ranked this response as one of the top two
As per the code manual this result highlights the importance that respondents place upon projects being called to account for the outcomes they generate specifically from third party stakeholders (e.g. participants, funders, government, etc.). In addition, it identifies the significance of networks and relationships as they relate to a decentralized network and the inclusion of autonomy and relational focus required of EfS projects.
Appendix 15. Research Project Information Sheet

Dear [insert title and name of potential participant],

I am a PhD student with the Sustainability Research Centre located at the University of the Sunshine Coast, Queensland, Australia. I am conducting a research project into ‘the facilitation of Education for Sustainable Development through a Decentralised Global Network’.

The aim of this study is to examine the facilitation of effective Education for Sustainable Development (EfSD) programs through the development of a theoretical framework that studies and accounts for a decentralised, global network’s operation as an International Not for Profit Association (INPA).

As a <project manager, supervisor, Country Coordinator and/or ENSI Council Member>, I would like to invite you to participate in this research as an as a Phase 1 or 2 interviewee (refer to the attached RPIS for more information). Involvement in this research will take no more than 30 minutes and will involve an interview conducted via phone or electronic medium (e.g. Skype). A survey may also be provided to a cross-section of ENSI stakeholders to assist in triangulating data.

Please note that participation in the study is entirely voluntary. If you would like to learn more about the study please respond by return email (or confirm via phone) and I will both discuss participation with you in further detail and provide you with a detailed Informed Consent and Project Overview Package.

Kind regards,

Mr. Michael Duggan

PhD Student
Sustainability Research Centre
Faculty of Arts and Business
University of the Sunshine Coast
Maroochydore DC 4558
Email mike.duggan77@gmail.com
Tel. 0434 140 069
Subject: Research Project Information Sheet

Title of Research Project: Scaling Up and Scaling Out: Facilitating Education for Sustainable Development through a Decentralised Global Network

Ethics approval number: S/11/364

The study is being conducted by Michael Duggan, Sustainability Research Centre, Faculty of Arts and Business, University of the Sunshine Coast.

The aim of this study is to examine the facilitation of effective Education for Sustainable Development (EfSD) programs through the development of a theoretical framework that studies and accounts for a decentralised, global network’s operation as an International Not for Profit Association (INPA).

The Reasons for the Research
Increasing recognition of environmental, economic and social issues on a global scale facilitated by advances in information and communication technologies are significant features of what has been termed globalisation (United Nations, 2003). These trends have also changed the education demands of individuals and nations, whereby education is increasingly considered an investment in the collective future of societies and nations, rather than simply the future success of individuals (UNESCO, 2002). This has implications for the way educational programs are conducted—particularly those of international significance and that require an effective combination of local and global perspectives—such as education for sustainability. An emerging trend in such fields has been the use of decentralised, global networks to develop and operate education programs, and this is likely to increase as communication technologies improve and the benefits of diverse and global perspectives are realised. Nevertheless, this is a recent approach and there is little documented evidence of the success of such approaches or of the inherent barriers and opportunities. This study seeks to develop the framework required to ensure organisations have a theoretical basis for developing and implementing their monitoring and evaluation programs that seek to enable effective means for facilitating education for sustainable development projects and initiatives.

The Significance and Innovation of the Research
There currently remains limited literature examining a decentralised network’s operation as a global organisation and how such organisations facilitate EfSD across scales, for example, scaling up from local to international projects/initiatives. In particular, Elias et al., (2003) note that the widespread implementation of effective EfSD programs requires ‘thoughtful realism’ about how to scale programs up and/or out. They suggest that these processes are ‘important’ and ‘possible’ albeit ‘difficult’ (Elias et al., 2003). The theoretical framework developed in this study seeks to address these difficulties implied in the literature and to make explicit the integral part that monitoring and evaluation of operational processes and organisational management play in the successful facilitation of EfSD programs and the organisations that develop them.
The Aims of the Research
The aim of this study is to examine the facilitation of effective Education for Sustainable Development (EfSD) programs through the development of a theoretical monitoring and evaluation framework that studies and accounts for an International Not for Profit Association’s (INPA) operation as a decentralised, global network. To achieve the central research aim several objectives are stipulated as follows:

- To examine the operational approaches used by a decentralised, global network in enacting its role as a facilitator of EfSD;
- To examine the ‘scaling up (organisationally) and scaling out (Geographically)’ of EfSD projects and initiatives;
- To examine the barriers and opportunities involved in an INPA’s facilitation of EfSD, and utilise these findings to suggest ways to reduce barriers, mitigate risks, and capitalise upon future opportunities for INPAs; and,
- To develop a monitoring and evaluation framework for decentralised, global networks.

The Research Questions

<table>
<thead>
<tr>
<th>Research Phases</th>
<th>Research Question</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1 Objective</strong></td>
<td>How does a decentralised, global network facilitate EfSD at a macro (i.e. Organisational) scale?</td>
</tr>
<tr>
<td>Case Study – Macro</td>
<td></td>
</tr>
<tr>
<td><strong>Phase 2 Objective</strong></td>
<td>How does a decentralised, global network facilitate and implement Education for Sustainable Development (EfSD) at a micro (i.e. project) scale?</td>
</tr>
<tr>
<td>Case Study - Micro</td>
<td></td>
</tr>
<tr>
<td><strong>Phase 3 Objective</strong></td>
<td>What are the barriers and opportunities to a decentralised, global networks scaling up and scaling out EfSD?</td>
</tr>
<tr>
<td>Synthesis of Phase 1 and 2 data</td>
<td></td>
</tr>
</tbody>
</table>
The Methodologies and Methods to be used in the Research

The following methodology and methods sections will provide an overview of the approach to research that will be utilised:

Methodology

The figure below outlines the research design:

Within this overarching methodology both survey questionnaire and case study methods will be used to examine an International Not for Profit Association’s (i.e. ENSI) operation as a decentralised, global network and its facilitation of EfSD programs. Both methods will be used to analyse how such issues can be examined in an integrated fashion to provide a comprehensive assessment of outcomes through the development of a theoretical framework and systemic monitoring and evaluation framework.

Methods

An indepth interview and online (web-based) questionnaire (combined with literature review) will be utilised to develop the conceptual model for the research and identify prospective case studies. Research participants (e.g. project managers and Country Coordinators) will be requested to attend 1 (one), 30 minute interview and/or complete 1 (one), 20 minute online questionnaire across all Phases of the research.

The table below provides an overview of the methods used in this research:

<table>
<thead>
<tr>
<th>Research Phases</th>
<th>Data required</th>
<th>Data collection</th>
<th>Data analysis</th>
<th>Contribution to research questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>Information about the INPA as an organisation</td>
<td><em>Step 1: interviews</em></td>
<td>Results of the interviews and document analysis are used to qualitatively</td>
<td>A comprehensive assessment of the challenges,</td>
</tr>
<tr>
<td>Case Study – Macro</td>
<td></td>
<td><em>Step 2: document analysis are used to qualitatively</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Phase 2 | Case Study – Micro | Step 1: An open-ended questionnaire  
Step 2: Interviews are conducted to qualitatively and quantitatively examine EfSD Programs.  
6 Key informant interviews | Results of the interviews and questionnaire are cross-examined through a methodological and data triangulation process. | A comprehensive analysis of how an INPA facilitates effective EfSD programs. |
| Phase 3 | Synthesis of Phase 1 and 2 data | Information will be collated from the results of phase one and two case studies. | A synthesis of the qualitative analysis from phase one together with the qualitative analysis from phase two. | The data will provide an understanding of facilitation of EfSD programs by an INPA. |

You do not have to participate in this research study if you do not want to and may amend or withdraw any information during the research period and do not have to give any reasons for withdrawing. If you do choose to withdraw from the research study at any time, any information received from you or pertaining to you that was obtained during the research will not be used and will be disposed of immediately. You will not be penalised or treated less favourably or lose any benefit if you do withdraw from the study.
It is anticipated that the risks/burdens of participation are minimal and should take no more than 30 minutes of your time. Risks have been deemed negligible via the completion of a project risk analysis required in order for this project to be granted ethics approval. Any information provided by participants during the research will be used only for the purposes of the research project. You will not be identified personally as a research participant and that summaries of any interview, questionnaires, and/or other forms of data collection will not be attributed to you personally in any publications or presentations arising from the research. All personal contact details provided for the purposes of communication with the principal researcher will remain confidential.

It is intended to disseminate the final results of the research as conference papers synthesising the main findings of the study and refereed international journal articles. They will also form part of Michael Duggan’s PhD Thesis. You will be provided with a summary of the results of the research and access to any published articles/papers and PhD Thesis material at the culmination of this research project.

If you have any complaints about the way this research project is being conducted you can raise them with the Principal Researcher or, if you prefer an independent person, contact the Chairperson of the Human Research Ethics Committee at the University of the Sunshine Coast: (c/- the Research Ethics Officer, Office of Research, University of the Sunshine Coast, Maroochydore DC 4558; telephone (07) 5459 4574; facsimile (07) 5430 1177; email humanethics@usc.edu.au).

You are able to take your time to think about whether you wish to participate in this study. If after having some time to think about it you decide you would like to participate, please contact the Principal Researcher, Michael Duggan, at the telephone number/e-mail address given above. Your response 7 days from reception of this RPIS Package would be appreciated as it is planned to commence the study shortly.

Thank you for your time. Michael Duggan (Researcher), Prof. Tim Smith (Primary Supervisor), Dr. Dana Thomsen (Secondary Supervisor), and the University of the Sunshine Coast appreciate your assistance with this research project.

Kind regards,

Michael Duggan

PhD Student
Sustainability Research Centre,
Faculty of Arts and Business
University of the Sunshine Coast
Maroochydore DC 4558
Email mike.duggan77@gmail.com
Tel. 0434 140 069
This page is intentionally left blank