

**Opportunities for Formal Education in  
Environmental Impact Assessment at  
Canadian Universities**

By

Colleen M. Stelmack

A Thesis  
Submitted to the Faculty of Graduate Studies  
in Partial Fulfillment of the Requirements  
for the Degree of  
Master of Natural Resources Management

Natural Resources Institute  
University of Manitoba  
Winnipeg, Manitoba, Canada

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## ABSTRACT

Universities have acknowledged society's justifiable concerns over the impact of development projects on the natural environment and they have attempted to address them through education. The purpose of this study was to identify the opportunities for environmental impact assessment (EIA) education and training offered through undergraduate and graduate programs at Canadian universities, and to gain further insight on how course instruction is addressing EIA.

The objectives included establishing the need for and types of EIA education and training, describing EIA course offerings, and identifying the role that Canadian universities are playing in developing EIA education and training programs. The research methods included a literature review, an Internet search of university course calendars for EIA courses and programs, interviews with twenty-one respondents teaching undergraduate and graduate level EIA courses in Canada, and participant observations.

The course calendar review identified EIA courses at 40 Canadian universities, but also found a shortage of clear programs devoted to teaching EIA. Opportunities for in-depth training in EIA or specialization in key topic areas such as cumulative effects and social impact assessment have been eclipsed by the preponderance of survey courses. There are few opportunities to specialize in applied EIA or to undertake research-oriented courses devoted to developing the science and standards of EIA.

It was discovered from the interviews that many professors and practitioners teaching EIA have experienced frustration with the real world application of EIA. This has caused many of them to lose enthusiasm for developing new courses or programs that could take EIA education to new levels. Professors want better trained EIA practitioners but their own lack of enthusiasm about the EIA process means that they are not offering new and exciting courses that would provide the detailed education needed.

Interviews revealed that EIA education and training could be revitalized and improved by developing clear teaching programs that include both theoretical and practical components of EIA. Universities should offer research-oriented courses dedicated to developing the science and standards for EIA and specialty areas such as cumulative effect, social impact assessment, strategic environmental assessment and other like topics. Additional support for EIA education includes developing training materials with Canadian content, and promoting EIA courses to non-environmental programs.

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My everlasting gratitude and love to my mother, Corrie. My friends, Mary McRuer, Andrea Swain and Joan Gordon are also my warm benefactors, standing by me through this unbelievable journey with their steadfast encouragement. Thanks for being there through all the joy, frustration, and tears. Thanks for believing in me when I was ready to give up. Thank you for your unwavering support, patience, and amazing good humour. These four incredible women are my personal heroes and my role models.

Also of great personal importance to me are my father Steve, brother Larry and sister-in-law Sharon. Special notes of gratitude and love go to my friends Doris Gyba, Les Staats, Brett McGurk, Maggie Wark, Inga Jahnke, Gertie Horton, Toni Morris and Markus Dyck for their friendship and support. Dennis and Gerry DeGroot, Mel and Ina Ryder, and Dave and Jeannie Unrau eased my concerns over my Dad, thus

giving me peace of mind to pursue my studies. Andrea Deters-Yarema and Angel Busch were invaluable help with those crazy office things. I am sure Angel will never forget the “secret of juniper.

This project is the culmination of a very long and arduous journey of self-discovery. Many times during this journey, my spirit felt trapped. Many times I thought I had lost my passion, that guiding light in this fog we call “life.” In Egyptian mythology, every 500 years the Phoenix consumes itself by fire, finally to emerge from its own ashes, reborn. Through some kind of serendipity, and with the help of friends, I found the courage to know that I could sacrifice everything to free my spirit. I have completed the journey of the Phoenix and I am prepared to take on the challenges ahead.

Ralph Waldo Emerson proclaimed, “What we call results are only beginnings.” While this thesis is a symbol of my search for my “authentic self,” it is emphatically and most victoriously another beginning.

## DEDICATION

*"Nobody can ever take a friend's place – nobody. A friend stands beside you and under you and lifts you up."* – Maya Angelou.

This thesis is dedicated with love to my friend, my soul sister, and my kindred spirit, Mary Graham McRuer who passed away, peacefully, on December 5, 2001 from recurring breast cancer. Mary taught me the true meaning of unconditional friendship. I am grateful to have shared the times that we did have together. We had such wicked fun! Mary had an extraordinary sense of humour, and she was ever so "classy."

Poor health limited Mary's choices in life. She suffered miserably, and yet she carried herself with such grace and dignity, something I will always admire about her. Mary's avid curiosity and open mind allowed her to enjoy so much of the world around her. Some lessons in life are learned, openly with your full participation. Others seep down into your subconscious to surface at pivotal times in your life. The lessons Mary taught me were the latter. Mary's courageous struggle to overcome pain and suffering inspired me to overcome self-doubt, quietly and unobtrusively.

Before she died, Mary gave me a memento to ease the pain of her passing. The inscription read: *"The two of us will never part; friends forever from the start."* Through countless memories, we will always be – Friends forever! And Mary whenever you see me heading for trouble, please flap your wings – I'll feel the breeze! Be at peace my friend.

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## CHAPTER 1: INTRODUCTION

### 1.1 Background

Environmental impact assessment (EIA) was introduced as a regulatory requirement in Canada in the 1970's to address potential threats to the environment posed by the Federal Government's development projects. The main thrust of the EIA process is informed decision-making about the potential for adverse environmental effects of development projects before committing financial, physical and human resources.

The framework for EIA originated in the United States in the early 1970's as a legal requirement of the *National Environmental Policy Act* (NEPA) (Clark, 1997). NEPA responded to the surge of public pressure to protect the natural environment. This was a concept fostered by the early conservation movement, and it was echoed in the broader American public. Under NEPA, federal agencies and programs were legally required to guarantee that the EIA process was open to public scrutiny by completing environmental impact statements on all government policies, programs and actions (Clark, 1997).

Then in 1983, the World Commission on Environment and Development (WCED 1987) emphasized the importance of the emerging concept of "sustainable development" that linked the two goals – environmental quality and economic development. The WCED (1987) spoke to the urgent need for countries to develop the capacity for integrating environmental, social, and economic considerations into

development decision-making (WCED, 1987). Since fundamental changes in thinking and practices were needed, it advocated the pivotal role of education in achieving major shifts towards more sustainable economies and lifestyles (WCED, 1987).

Eventually, at the 1992 Earth Summit in Rio, EIA gained international acceptance as a tool for sustainable development (Keating, 1993). EIA was identified as one of the “key mechanisms” to make economic development sustainable (Sadler & Jacobs, 1990). Countries that committed to the Rio Declaration (Canada included) forged ahead by developing the capacity for EIA (Clark, 1999).

Key milestones in Canada’s provincial, federal and international experiences with EIA are summarized in **Table 1**. At the federal level, formal impact assessment guidelines were first established under the *Federal Environmental Review Process Guidelines Order* of 1974, but it was not until 1995 that environmental assessment was legislated under the *Canadian Environmental Assessment Act*. Parallel to the evolution of the federal EIA process, the Canadian provinces and territories began developing their own environmental assessment legislation, regulations and guidelines. Beginning in 1998, the federal government and the provinces embarked on a process of coordinating their respective EIA’s through harmonization agreements. Beyond the domestic level, Canada shares 30 years of experience in EIA development through an affiliation with the International Association for Impact Assessment (IAIA). Canada has an extensive history with EIA, and this suggests that EIA in Canada is supported by strong education and training programs.

**Table 1: Highlights of the development of EIA in Canada**

Date	Jurisdiction	Experience
2000	Canada	5 Year Review Canadian Environmental Assessment Act
1998	NWT/ Nunavut	Mackenzie Valley Resources Management Act
1998	Yukon	Draft of the Yukon Development Assessment Act and Regulations
1998	Canada and Provinces	Canada-Wide Accord on Environmental Harmonization and the Sub-Agreement on Environmental Assessment-the coordination of federal/provincial EIA's.
1996	Canada	Publication of the International Study of the Effectiveness of Environmental Assessment
1996	Manitoba	The Sustainable Development Act
1995	Canada	The Canadian Environmental Assessment Act administered by the Canadian Environmental Assessment Agency
1995	British Columbia	The British Columbia Environmental Assessment Act
1994	Canada	Hosts International Summit on Environmental Assessment in Quebec City
1992	Alberta	Environmental Protection and Enhancement Act
1992	Canada	Canada signs the Rio Declaration accepting EIA as a tool for sustainable development
1990	Newfoundland/ Labrador	Environmental Assessment Act
1988	Manitoba	The Environment Act
1988	Nova Scotia	Environmental Assessment Act (revised 1996)
1988	PEI	Environmental Protection Act
1987	Canada	The Report from the National Task Force on Environment and Economy (Canada's response to the WCED)
1987	International	The World Commission on Environment and Development (WCED)
1986	New Brunswick	Adoption of an EIA framework in the Clean Environment Act
1984	Canada	The Canadian Environmental Assessment Research Council – funded to conduct research in EIA (ended 1992)
1984	Canada	Formalization of the Environmental Assessment and Review Process Guidelines Order (EARP) administered by the Federal Environmental Assessment Review Office (FEARO)
1981	Quebec	Environmental Quality Act
1980	Saskatchewan	Environmental Assessment Act
1975	Ontario	Environmental Assessment Act amended to Environmental Assessment and Consultation Improvement Act
1975	New Brunswick	EIA adopted through a Cabinet Policy
1974	Canada	Establishment of the Environmental Assessment Review Process (EARP) as a Cabinet Decision

In spite of the extensive legal framework for EIA in Canada, a deficiency was noted in administering the EIA process – the limited opportunities for capacity building through education and training. Commenting on the status of EIA in Canada, Peter Croal and Keith Grady (1998) stated:

*“In comparison with other countries such as the UK, Canada has an acute shortage of post-graduate studies in EA. A stronger educational base is required for the advancement of both Canadian professional practice and policy development. Current efforts to promote accreditation of EA practitioners in Canada may provide incentive to establish formal post-graduate programs in this area”.*

The institutional response to promoting sustainable development is capacity building, including capacity building for EIA (UNEP, 1996; Clark, 1999). One aspect of capacity building for EIA requires that educational institutions establish programs that raise the level of environmental awareness and develop the knowledge and skills needed for individuals dealing with the complexities of the EIA process (UNEP, 1996; Clark, 1999).

Capacity development in EIA is complex. It involves (a) a diverse group of people with varying levels of knowledge and interests, (b) complex and evolving theories, methodologies and procedures, (c) ongoing research directed towards developing and improving the process, and (d) an interdisciplinary approach that integrates the biophysical/social/economic sciences with risk assessment (Lee, Wood & Gazidellis, 1985; Gibson, 1993; Wood, 1995; Sadler, 1996 & 1998; Sinclair, 1997; Clark, 1999).

The unique characteristics of EIA must be considered when determining what is relevant to EIA training programs. Lee, Wood, and Gazidellis (1985) argued that it

was not the quantity of EIA courses that was important, but that the kind and quality of the courses that mattered. Quality meant that: the education and training should target those who most benefit from training; different types and levels of training were required to meet EIA objectives; and the content of training courses should vary based on need (Lee, Wood, and Gazidellis, 1985; UNEP, 1996; Clark, 1999).

Since EIA combines knowledge from a wide range of disciplines, trainees must be able to critically evaluate development projects and find creative ways of applying the principles of sustainable development. EIA training should also be applied and provide opportunities for practical experience (UNEP, 1996; Clark, 1999). Ultimately, the overall quality of the EIA process should be supported by a strong conceptual and theoretical foundation that addresses such issues as risk, uncertainty and alternative approaches to development (Lawrence, 1999).

## **1.2 Problem Statement**

The extensive legal, technical and administrative requirements for EIA across Canada involve numerous individuals with different levels of training to achieve the many objectives of EIA. Approximately 90 publicly funded universities across Canada offer professional accreditation or grant degrees at three levels of study: bachelor, master and doctoral levels (CICIC, 1997). If education and training in EIA are critical to the effectiveness, efficiency and fairness of EIA, then the Canadian education system must respond to the need for EIA related programs. Ongoing training through higher education at universities, and opportunities for continuing



professional development should be available to support and strengthen the efficiency of the EIA process.

The purpose of this study was to identify the opportunities for EIA education and training offered through undergraduate and graduate programs at Canadian universities, and to gain further insight on how course instruction is addressing EIA.

### **1.3 Objectives**

The specific objectives were to:

1. Establish the need for and types of EIA education and training;
2. Describe university course offerings;
3. Identify the role that Canadian Universities are playing in developing EIA education and training programs; and
4. Identify ways that EIA university course offerings could be modified/supported.

### **1.4 Scope of the Research**

This study was not a survey of the supply or demand for EIA professionals. It was limited to EIA education and the opportunities for professional training in EIA at Canadian universities. While there is reference to informal training courses offered by the federal and provincial EIA agencies, those informal training courses were not reviewed for this study. Additionally, courses offered at community colleges were not included, but there is reference to joint community college/university certificate programs.

## **1.5 Importance of this Study**

This study is important because the literature specifically relating to formal EIA education and training was dated, and it focused mainly on the European experience in capacity building for EIA education. There were limited references to EIA at Canadian universities. This study adds to the literature by providing a current account of Canadian EIA courses and course content in relation to EIA as a tool for making economic development more sustainable.

## **1.6 Methods**

This study describes courses and programs relating to EIA that are offered at Canadian universities. The study used a qualitative interactive approach, including a literature review, a questionnaire and telephone interviews (Babbie, 1995; Merriam, 1998).

The approach began with a literature review of research publications on EIA education and training and of publications that referred to the relationship between EIA and formal university education. A review of Canadian university course calendars and curriculum provided the basic information on who was teaching EIA, the number and types of EIA courses offered, and which institutions offer EIA related programs. Next, interviews with Canadian university professors associated with EIA educational programs provided in-depth details of EIA course offerings. Additionally, personal participation in formal EIA training and informal training courses was used to support comments on EIA education and training courses.

## **1.7 Organization**

Chapter 2 provides a reference for this study by describing EIA and higher education, the relationship between EIA and formal education, and what is known about EIA education and training through relevant literature. Chapter 3 details the research methods used in the undertaking of this study. The results of the university course calendar review and the results of interviews with respondents teaching EIA courses are presented and discussed in Chapter 4. Chapter 5 continues with a discussion of what the respondents saw as the problems with EIA and EIA education in Canada in comparison with the results from Chapter 4. Finally, Chapter 6 summarizes the findings relative to the stated objective of the study, and it presents conclusions based on the findings. It then concludes with recommendations on how formal EIA education at Canadian universities can be modified and supported.

## **CHAPTER 2: EIA AND FORMAL EDUCATION**

### **2.1 Overview**

This chapter reviews the literature on capacity building for EIA and higher education. It introduces EIA, and explores the relationship between EIA and higher education. The section on higher education examines the role of formal education, and it highlights the characteristics of environmental education and educating for sustainable development. The chapter then illustrates the fundamentals of capacity building in EIA education and training as described in the early literature. Finally, the chapter looks at the availability of courses and programs at Canadian universities in the mid 1980's and the various recommendations on what improvements were needed in EIA education in Canada. This chapter is also a foundation to evaluate whether or not the opportunities for EIA education and training have improved over time.

### **2.2 Environmental Impact Assessment**

Firstly, Sadler (1996) described EIA as a “plural process that is shaped by the interaction of many players”. It is a democratic, multidisciplinary process for gathering and analysing environmental information within a formal institutional framework. Furthermore, EIA expresses a project's environmental consequences, social and health risks, and cumulative effects early in the planning stage of project development (Lee, Wood and Gazidellis, 1985; Wood 1995; Beattie 1995; Sadler, 1996; Sinclair, 1997; Lawrence 1997a).

Clark (1999) described the institutional framework for EIA. He cited Hiderbrand and Grindle's five key components for capacity building for EIA as the overall context, educational institutions, organizations, the public sector, and formal and informal networks and linkages (Clark, 1999).

The overall context referred to the political economy in which the other four components, the various institutions, function (Clark, 1999). The *Constitution Act*, 1867 and the 1982 amendments to the *Constitution Act* define the distribution of power in Canada. Environmental policies have been at the centre of numerous federal-provincial jurisdictional disputes because there were no clear guidelines for the overlap of jurisdictional responsibilities with respect to environmental matters (Doern & Conway, 1994). The division of power between the provinces and the federal government shapes Canada's core institutions (Doern & Conway, 1994). Education and natural resources fall under the jurisdictional control of the provinces and territories while matters of trade, navigable waterways, fisheries, aboriginal people, and ownership of federal land belong to the federal government (Doern & Conway, 1994). Furthermore, **Table 1** demonstrated how EIA legislation cuts across numerous jurisdictional boundaries. As a result, EIA education must focus on developing consistencies in the EIA methods and procedures that overcome the conflicting context or jurisdictional environment in which EIAs are conducted.

Secondly, EIA is a complex network of tasks. EIA systems consist of three major components: (1) the policy/regulatory component, (2) the methodological or applied component, and (3) the evaluation and decision-making component (Spaling, Smit and Kreutzwiser, 1993; Lawrence, 1994; Sadar and Stolte, 1996). Each

component includes groups of individuals, professionals, and technicians needing specialized and general knowledge and training about the EIA (Gibson, 1993; Doyle and Sadler, 1996). Ideally, EIA is intended to be a collaborative process that ends with environmentally sustainable development projects (Gibson, 1993; Doyle and Sadler, 1996).

Thirdly, the open and democratic nature of the EIA makes it a controversial process. On one hand, EIA has been characterized as being subjective (Mostert, 1996). In the EIA process, Mostert (1996) and Sadler (1996) argued that there were numerous opportunities for participants and stakeholders to satisfy individual goals by influencing the choice of methods, the choice of alternatives, and the choice of values attached to the measured attributes. For these reasons, EIA has been highly criticized for being biased, value laden, and politically contentious (Beattie, 1995). On the other hand, the key objective of sustainable development is to transcend the traditional political and economic indicators by introducing an environmental and social consciousness into development planning (Fenton and McQueen, 1996). To this end, EIA grew to be a platform upon which the relevant stakeholders might voice their concerns, state their values, and challenge how natural resources are allocated and used as a means of challenging the current pro-development paradigm (Diduck and Sinclair, 1997b; Diduck, 1999).

Finally, EIA is a continually evolving field. While the institutional framework for EIA in Canada is well established, the laws, procedures, and methods supporting EIA differ greatly across administrative jurisdictions (Gibson, 1993). As stated previously, the circumstances and conditions that drive the federal EIA process differ

from those of the provinces, and they are further beset by differences amongst the provincial EIA processes. Gibson (1993) contended that improving the effectiveness of EIA meant strengthening linkages and increasing human understanding of the relationship between development and ecological sustainability. Local, national, and international interest in upgrading and improving the EIA “process, practice and performance” led Saddler (1996) to argue that an assemblage of “best practices” resulting from ongoing education, training and research must guide EIA.

### **2.2.1 EIA and Sustainable Development**

Capacity building for EIA must address a variety of complex issues to make the EIA process an effective, efficient and fair tool for sustainable development. EIA is situated within a complex network of institutions and organizations. Hukkinen (1998) stated, “Institutions matter to sustainable development, because they are the social rules that guide the design of environmental management.” According to Hukkinen (1998), sustainable development cannot be achieved without a social policy that is guided by a clear long-term goal for sustainable development. He further emphasized that people’s perceptions dictated how organizations evolve. For example, Nattrass and Altomare (1999) contended that organizations must accept the reality of sustainable development and alter their behaviour by incorporating sustainable practices into day-to-day operations.

*Through education and training, employees develop the conceptual framework, the shared mental model, that make it possible to explore what is sustainable and unsustainable behaviour (Nattrass & Altomare, 1999).*

Canadians have promoted environmental awareness and instituted policies that protect the environment. However, the ongoing struggle continues over establishing a shared vision of what constitutes environmental protection and sustainable development that is consistent throughout civil society, public sector policies and private sector economic goals (Dwivedi, Kyba, Stoett, & Tiessen, 2001). Commenting on the status of sustainable development in Canada, Dwivedi, Kyba, Stoett, and Tiessen (2001) identified the following shortcomings of policies and decision-making that specifically related to EIA and sustainable development:

- Regulations and guidelines are inconsistent with respect to what projects are included or excluded from the EIA process. These inconsistencies also differ between political jurisdictions.
- EIA policies grant discretionary powers to elected officials with respect to what gets assessed and how information flows to the public.
- Following on the above point, considerable leeway is given to project with major economic benefits.
- The EIA process overlooks the cumulative effects of smaller projects that combined may have a significant negative environmental impact.

Dwivedi, Kyba, Stoett, and Tiessen (2001) concluded that while the EIA process was not perfect, it triggered an awareness of the potential for negative environmental consequences of development projects. This is far from the



sweeping behavioural changes that Hukkinen, Nattrass and Altomare (1999) were promoting for sustainable development.

## **2.3 Environmental Impact Assessment and Higher Education**

Over the past thirty years, universities have responded to addressing environmental and sustainable development issues through education. This section describes the relationship between EIA and formal education, and the daunting challenges faced by universities with respect to course instruction in environmental related issues.

### **2.3.1 The Relationship between EIA and Education**

The EIA process has been described as a learning experience. Meredith (1995) pointed out that EIAs were situated within a complex institutional setting with each institution governed by different realities (social, economic, and scientific). Sadar and McEwen (1994) contended that EIA raised the level of awareness for the need to learn more about ecology, ecological economics, environmental ethics, uncertainty, and risk analysis. To that end, EIA was concerned with developing knowledge – knowledge about the information needs for conducting EIAs, and knowledge about how to convey information about EIA to the various stakeholders in the EIA process (Sadler, 1996; Diduck and Sinclair, 1997a, 1997b; Greer-Wootten, 1997; & Diduck 1999). Roots (1994) aptly described EIA as a vehicle for “collective social learning”.

EIA revolutionized the concept of development planning. Spaling, Smit and Kreutzwiser (1993) stated that EIA added a series of disaggregated tasks (scoping,

assessing, predicting, evaluating, mitigation, monitoring, auditing, decision-making) to the planning process that were unfortunately met with conflicting views on the appropriate methods chosen for evaluating environmental impacts.

While the tasks were disaggregated, the methods attempted to be integrative. EIA methods fused theories from such disciplines as planning, natural sciences, sociology, economics, public policy and organizational behaviour (Meredith, 1995; Lawrence, 1997b). EIA was intended to bridge the natural sciences based on positivistic objective analysis with the social sciences to broaden understanding of the overall environmental impacts of development projects on humans, the natural environment and other organisms (Gibson, 1993; Beattie, 1995; Sadar and Stolte, 1996; Lawrence, 1997b; Greer-Wootten, 1997). Regardless of the intention for EIAs to be collaborative, Jorjani and Dyer (1996) argued that "experts" persistently affected the final outcomes of EIAs by imposing their own disciplinary understanding when implementing the designs and selecting the performance measurements.

The glaring "absence of holistic environmental education at the university level" did not escape the attention of Canter and Clark (1997). Roots (1994) contended that developing the knowledge, science, and research for EIA was critical to the success of the EIA because practitioners required both an arts and science mind-set when approaching EIAs. Furthermore, EIA education needed to be interdisciplinary by bridging policy, procedural and scientific elements (Jorjani and Dyer, 1996). Above all, state-of-the art EIA training should explore new subject areas such as ecological economics, traditional ecological knowledge, consensus building, and conflict resolution (Diduck and Sinclair, 1997a, 1997b).

Equally important was the need to build a theoretical foundation for EIA. EIAs weave together complex environmental issues, with some based on facts and others based on values. And, they employ models and methods drawn from a variety of disciplinary fields (Spaling, Smit, & Kreutzwiser, 1993; Lawrence, 1994; Lawrence, 1997b). Lawrence (1994; 1997b) maintained that EIA theory was vital to reinforce the structure and credibility of EIA, to provide guidance for identifying and setting goals, dealing with the knowledge gaps, risk, and uncertainty, and to bridge bodies of disciplinary discourse related to economic development and the natural environment.

EIA should be supported by ongoing research. Sadar and Stolte (1996) upheld the need for multidisciplinary research that focused on ecological impacts and the linkages between human and environmental health. More specifically, Fenton and McQueen (1996) supported the value of university led research because it was (a) conducted at arms length from business and industry, (b) peer reviewed, and (c) supported by an infrastructure of equipment, teaching programs, and research grants.

In summary, the defining characteristics of EIA are complex. EIA education must not only seek to build a knowledge base for EIA but be forward looking and research oriented.

### **2.3.2 Higher Education**

Universities play a pivotal role in shaping the societies that they serve. They must be flexible and capable of responding to society's rapidly changing needs. Universities were compelled to develop curricula oriented to teaching and learning

about the environment and sustainable development as the urgency to understand what was happening to the environment increased.

### *i. The Role of Higher education*

Higher education serves several important purposes. The primary purpose of higher education was defined as the epistemological or scholarly search for knowledge and understanding of the world; education for its own sake (Brubacher, 1977; Feinberg, 1983; Gale & Densmore, 2000). Secondly, higher education was defined as vocational training where students acquired occupational skills specifically tailored to a profession (Brubacher, 1977, Feinberg, 1984, Gale & Densmore, 2000). The third purpose of higher education was characterized as political in nature (Brubacher, 1977; Feinberg, 1983; and Gale & Densmore, 2000). Brubacher (1977), Feinberg (1983), and Gale and Densmore (2000) described higher education as a social good through which the essential knowledge and skills needed to maintain a society were transferred to subsequent generations. Feinberg (1983) referred to this as “intergenerational continuity” where education ensured the continuity of the status quo established by the ruling members of the society.

The difference between the above approaches to education affected curriculum development. Gale and Densmore (2000) stressed that vocational education was focused on skill development with “less emphasis on critical thinking as a key ingredient for improving the quality of democracy in our society.” Liberal education, on the other hand, was more critical of social norms. It involved problem solving,

critical reflection, and synthesis of knowledge from different disciplines in relation to changing social norms (Brubacher, 1977; Gale & Densmore, 2000).

University programs are organized into traditional “specialized discipline groups” (Stark, 1998). Most undergraduate programs are structured around the natural sciences, social sciences and humanities that are defined by generally accepted epistemologies, techniques, theories, methodologies, and performance measurements supported by the members of each distinct group (Stark, 1998).

Universities also offer programs that are structured around applied and professional fields of study (also referred to as career fields) (Stark, 1998). Examples of career fields include engineering and urban and regional planning. According to Stark (1998), career programs were “users of knowledge rather than the pursuers of knowledge” because they borrowed theories, techniques and methods from the established disciplines, and they tailored programs to suit their role in society as “problem solvers”. While they borrowed methodologies from the traditional disciplines, the result was that career fields ended up forging their own specialized groups (Stark, 1998).

Universities provide a wide range of undergraduate, graduate and professional degree programs along with a selection of certificate and diploma programs (CICIC, 1997). Degrees are awarded based on the accumulation of formal instruction credit hours (Johnstone, 1996; Ratcliff, 1997). The degree requirements are tailored to the specific programs. Each program offers a cluster of prescribed courses tailored to the major or academic specialty area (Johnstone, 1996; Ratcliff, 1997). To round off their

studies, students choose from a body of elective courses (generally offered outside the major area of study) to complete the credit hour requirement for a degree (Johnstone, 1996; Ratcliff, 1997).

## ***ii. Education or Training?***

While the terms, “education” and “training,” may be used synonymously and interchangeably, there are marked differences between them. Education “prepares students for highly skilled occupations such as law, medicine, and engineering, through a combination of theory and practice culminating in an award of certification, licensure, or other formal credential” (Hutcheson, 1997). Training, on the other hand, is skill oriented; it involves learning rote procedures and applying learned skills efficiently and effectively (Feinberg, 1983). More specifically, vocational training involves “preparation for jobs that call for extensive practical experience and training but have few requirements for theory, technical knowledge, or liberal arts education” (Hutcheson, 1997).

## ***iii. Environmental Education/Educating for Sustainable Development***

Universities play a pivotal role with respect to EIA education. The multidisciplinary nature of EIA challenges the traditional disciplinary specialization of university programs (Sadar and McEwen, 1994; Lawrence 1997b; Jorjani and Dyer, 1996; Sadler, 1996; UNEP, 1996; Clark, 1999). Clark (1999) drew attention to the “strict demarcations that exist between faculties and programs in many universities and training institutes.” University faculties compete for such tangible benefits as funding and equipment (Fenton and McQueen, 1996). Fenton and

McQueen (1996) argued that competition for financial support was detrimental to environmental research and education where it contravened conventional worldviews, particularly the pro-development paradigm. Luke (1999) regarded this competition as a power struggle that maintained the pro-development/resource exploitation mind-set. As Fenton and McQueen (1996) pointed out, society is still preoccupied with traditional political and economic measurements and indicators. According to Luke (1999), the recent “environmental episteme” was not reshaping behaviour, and therefore, he accused university faculties of shaping the environment to the disciplines in order to maintain the status quo within disciplines.

At the outset, environmental education was not conceived as a new discipline, but rather a concept incorporated into traditional disciplines to promote “an ecological way of thinking, by shifting from a worldview based on exploitation of nature to one based on respect and care” (Mortari, 2000). Luke (2001) described environmental education thusly, “Environmental education must weave an analysis of power, politics and the state into an ecology’s sense of sustainability, survival and the environment.” Bosselmann (2001) recognized that the ambiguity of terms like ‘sustainability’ and ‘environmental education’ challenged curriculum development as to what education should target. Bosselmann (2001) pointed out that environmental education was not just about building up a knowledge base about ecosystems. Environmental education was not about developing new knowledge (Arjen, Wals, & van der Leij, 1997; Stables, 2001). It was a chance to reconsider and critically evaluate existing knowledge domains and power structures in order to rework what

was originally understood about the interaction of human communities with their environments (Arjen, Wals, & van der Leij, 1997; Stables, 2001).

Educating for sustainable development created entirely new teaching and learning opportunities for universities. Bosselmann (2001) pointed out that interdisciplinary education necessitated moving away from traditional teaching and learning methods to a holistic approach to teaching and learning (**Table 2**).

**Table 2:** Teaching and learning for sustainable development. Source: Bosselmann (2001).

Traditional Teaching Methods	Teaching for Sustainability
Reproductive learning	Discovery learning
Linear transport of material	Investigative learning
Knowledge from books	Exploration of reality
Passive reception of information	Active learning
Reproduction of facts	Productive action
Acquiring knowledge	Experiential learning

According to Bosselmann (2001), interdisciplinary education for sustainability must be a democratic and cooperative experience for students. To be democratic, students ought to be proactive in stating their education needs and expectations from their learning experience (Bosselmann, 2001). He contended that in teaching for sustainable development, universities had a mandate to teach students how to find new solutions to long-standing economic, political and social problems (Bosselmann, 2001). Cooperation involved teaching students how to think across the individual disciplines in two ways. The first was through the individual accumulating knowledge



of other disciplinary methodologies, and the second was through a team approach to sharing knowledge and experience in problem solving (Bosselmann, 2001).

As stated previously, environmental education created an opportunity to critically evaluate the knowledge domains that direct humankind's relationship with the environment. Ikuenobe (2001) stated, "To think critically involves being able to question and evaluate beliefs in order to optimize the reasonableness of a belief." Teaching methods should therefore encourage students to critically examine those knowledge domains in relation to environmental impacts. Ikuenobe (2001) suggested the following teaching methods to promote critical thinking in the classroom: Socratic teaching (open-ended questioning), evaluating available evidence, and questioning the fundamental methods used for analyzing problems.

The enrichment of the teaching/learning experience for interdisciplinarity depends upon whether the class is teacher-centred or student-centred (Jones & Merritt, 1999; Robson, 1999). Robson (1999) defined active teaching and learning as, "the use of strategies which maximize opportunities for interaction" as follows:

- Active teaching and learning encourages high levels of participation;
- Participants share values and assumptions from different disciplines;
- Participants add to discussions by sharing prior knowledge and experiences; and
- Active learning provides both an open atmosphere and an opportunity for students to take responsibility for their own learning experience.

Jones and Merritt (1999) and Robson (1999) argued that active and interactive classrooms create an atmosphere that encourages students to openly question knowledge claims. They therefore supported the following teaching methods: Socratic teaching, role-playing, research based projects, case studies, student led discussions, and group collaboration (Jones & Merritt, 1999; Robson, 1999).

Respondents involved in environmental education and teaching for sustainable development are faced with the many challenges of adapting the teaching and learning experience. The curriculum must bridge the natural and social science gap, and it must encourage students to think differently about how humans interact with the natural environment and other organisms.

## **2.4 EIA - A Blueprint for EIA Education and Training**

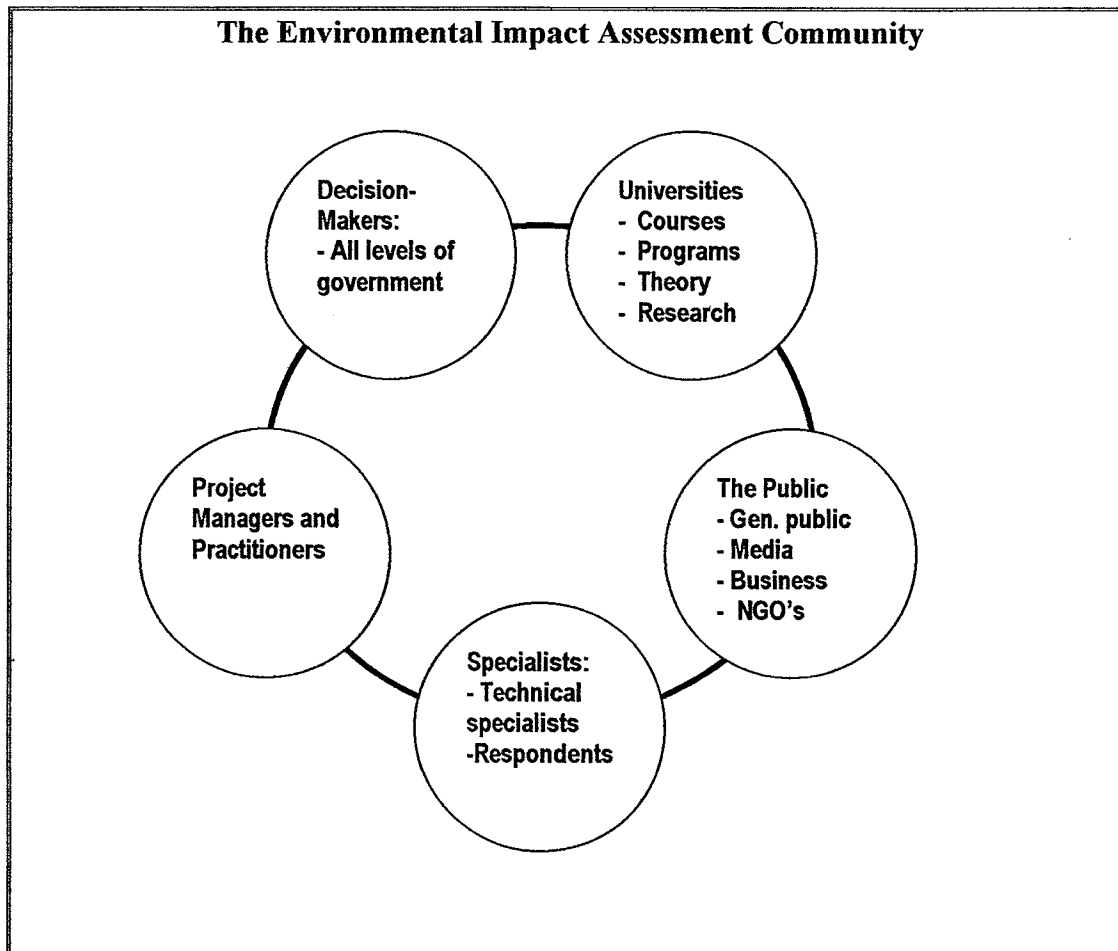
In the 1985 *Arrangements for Environmental Impact Assessment and their Training Implications in the European Communities and North America: Country Studies*, Lee, Wood, and Gazidellis described the status of EIA education and training in nine European countries, United States, Canada (see section 2.5), and New Zealand. The study inspired a coordinated effort to improve the capacity for EIA in the European Community. The study was based on “country reports” that were compiled by various authors from the participating countries in coordination with Lee, Wood and Gazidellis (Lee, Wood & Gazidellis, 1985). The data collection techniques varied by country, and they included varying combinations of literature reviews, questionnaires, interviews, and findings from workshops (Lee, Wood, & Gazidellis, 1985).

In 1993 and 1994, The European Commission sponsored two workshops in a concerted effort to reinforce the need for EIA education, training, and research. The resulting publications further characterized EIA education and training and recommended improvements in the following areas: the advancement of post-secondary education through undergraduate and graduate programs, the development of continuing education programs for practitioners and trainers, and the establishment of EIA centres for ongoing research and support (EIA Training, 1995).

Clark (1999) also described capacity building for EIA by drawing from the literature arising from the European workshops, the United Nations Environment Programme, and other sources. The following sections summarize how the literature described target groups, training needs, training delivery, course content, and training methods for EIA education and training.

#### **2.4.1 Defining Target Groups**

EIA training should target four broad groups of people depending upon their role in the EIA process (Lee, Wood, & Gazidellis, 1985, Sinclair & Diduck, 1995; Clark, 1999). The four major groups of individuals represented in the EIA community are political and administrative decision-makers, EIA project managers, EIA specialists, and the public (**Figure 1**). The key group that completes the EIA community is universities. The educational need for each group varied but at some level, all groups required a common understanding of the basic principles of EIA.



**Figure 1:** The environmental impact assessment community (Lee, Wood & Gazidellis, 1985; Sinclair & Diduck, 1995; and Clark 1999).

Lee, Wood, and Gazidellis (1985) and Clark (1999) outlined the specific characteristics of each group as follows:

- a. **Decision-makers** included government administrators authorized to initiate and approve development projects at the applicable levels of government. This group also included those responsible for policy and the legal requirements related to implementing and administering EIA.
- b. **EIA project managers** included senior administrators who coordinated the EIA process and reviewed the EIA reports.

- c. **EIA specialists** referred to technical specialists like engineers, economists and environmental consultants. Included in this group were respondents and those individuals who provided technical support in various aspects of the EIA process.
- d. **The public**<sup>1</sup> includes individuals and groups who have serious concerns about the potential adverse environmental effects of a project. The public includes individuals, community groups, business, industry, the media, environmental groups, non-government agencies, and others.
- e. **Universities** provide formal education, theory building and peer-reviewed research in EIA.

#### 2.4.2 Training Needs

The content of EIA training courses has been defined by the common needs and demands of the individual target groups and the role that the groups play in the EIA system (Lee, Wood & Gazidellis, 1985; Clark, 1999). **Figure 2** summarizes the three broad categories of training needs.

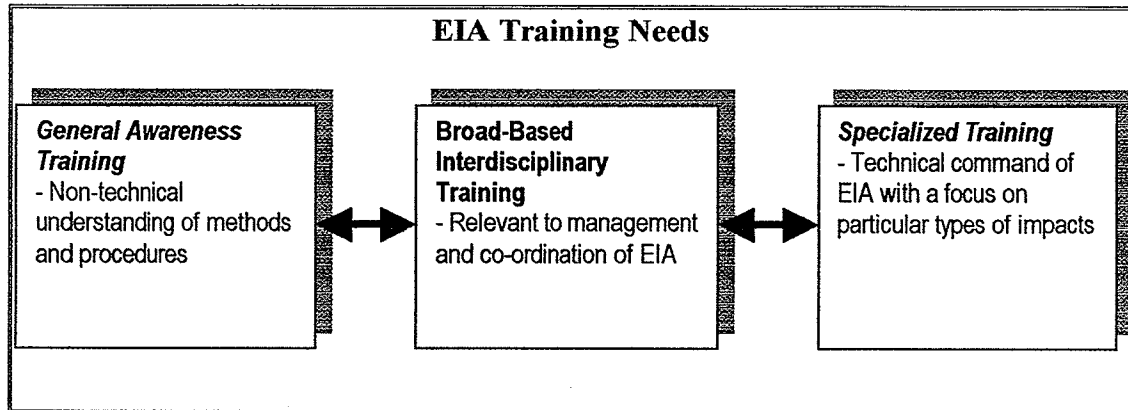
Lee, Wood and Gazidellis (1985) and Clark (1999) described the more specific characteristics of the training needs as follows:

- a. **General Awareness Training:** General awareness training seeks to provide a general understanding of the broad legal requirements for EIA and EIA

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<sup>1</sup> Public participation is a key element in the EIA process. Sinclair and Diduck (1995) described the need for adult education in EIA, and they described informal "education techniques" that enhanced the public's involvement in the EIA process in Canada.

procedures and methods. Those who would benefit from these courses included senior administrators, politicians, and business executives.



**Figure 2:** EIA training needs. Adapted from Lee, Wood, and Gazidellis (1985) and Clark (1999).

b. **Broad-Based Interdisciplinary Training:** Lee et al (1985) identified this category as "EIA project management", but Clark's (1999) description reflected the evolution towards the interdisciplinary holistic orientation of EIA. This training category addressed the need for a detailed knowledge of legal requirements, and methods and procedures including an understanding of the "science" of EIA. According to Clark (1999), three groups benefited from this type of training program: project manager, technical experts, and review experts.

c. **Specialized Training:** Specialized training was needed for particular types of environmental impacts (air, soil and water) and methods related to specific assessment tasks (hazardous waste facilities, environmental auditing and technological assessment).

There are no clear boundaries between the training needs. Some EIA professionals undertake a dual role in the EIA system. Clarifying the training needs and the training groups are valuable strategies that help to develop the methods for course delivery and content.

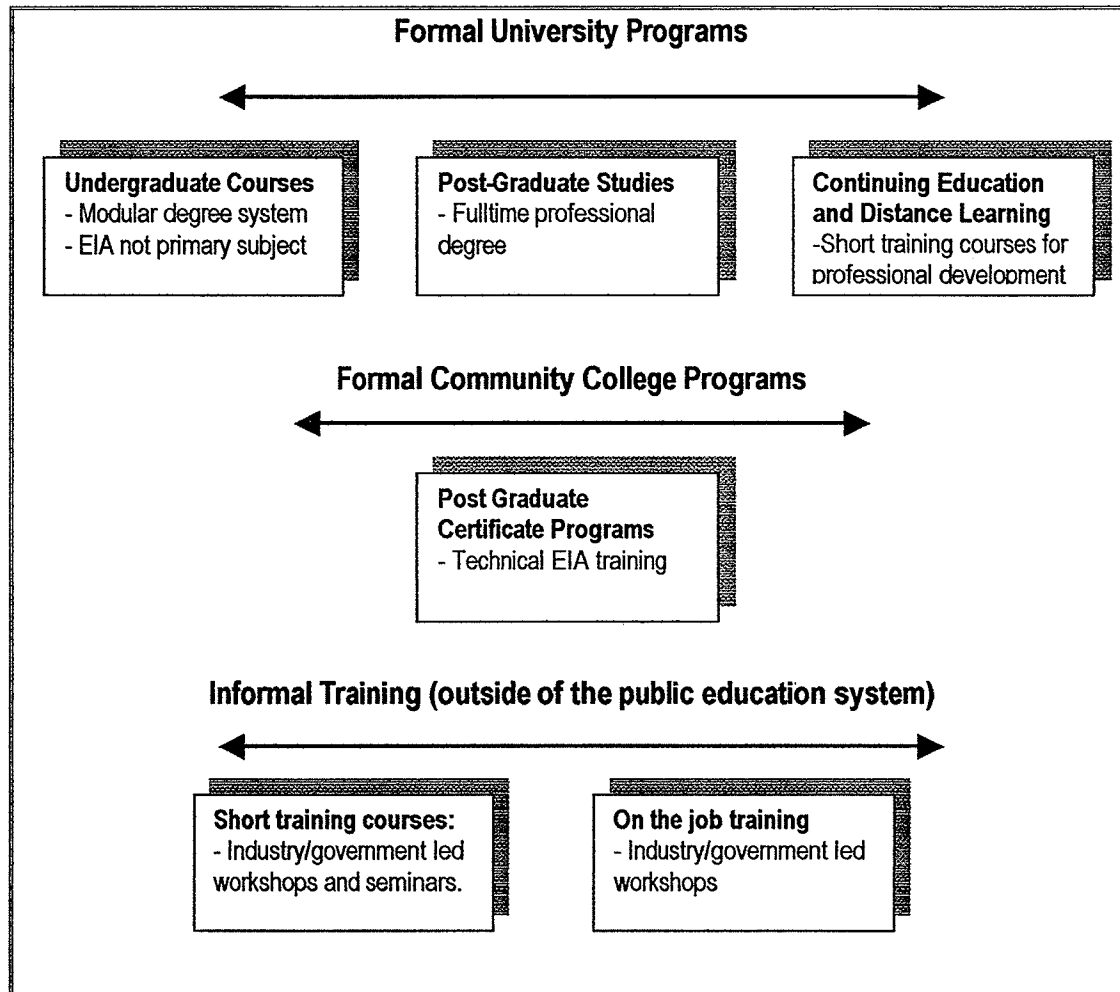
### **2.4.3 EIA Training Delivery**

The institutional programs considered appropriate for the delivery for EIA training distinguished between formal post-secondary education offered at colleges and universities and informal professional development offered through training centres (Lee, Wood, Gazidellis, 1985; Clark, 1999). **Figure 3** summarizes the formal and informal education and training programs compiled from information supplied by European, North American and New Zealand universities (Lee, Wood and Gazidellis (1985).

The detailed characteristics of formal and informal EIA training provisions described by Lee, Wood and Gazidellis (1985) and Clark (1999) were as follows:

- a. **Undergraduate level training:** Undergraduate training follows a modular degree system where students (i) complete a cluster of specialty courses that meet the major requirement of the degree offered, and (ii) self-select from a set of electives courses that add to general knowledge. EIA was not considered a major subject area in undergraduate programs. Students were specializing in environmental science, geography, chemistry, ecology, or professional degrees such as engineering all of which serve as background knowledge for preparing an EIA (Lee, Wood, & Gazidellis, 1985; Clark,

1999). EIA courses were providing a general understanding of EIA methods, and a foundation for postgraduate work in EIA (Lee, Wood, & Gazidellis, 1985; Clark, 1999).



**Figure 3: EIA training programs.** Adapted from Lee, Wood, and Gazidellis (1985) and Clark (1999).

- b. **Postgraduate training:** Graduate studies offer a modular degree system similar to undergraduate programs. Graduate studies programs such as engineering, and landscape/regional planning have introduced EIA awareness courses or interfaced with other programs specializing in EIA. Students wishing to pursue a management career as environmental



specialists (MSc diploma) enrolled in two-year graduate programs specializing in EIA. Universities, in the United Kingdom for example, support EIA centres that specialize in EIA research and training (Lee, Wood, and Gazedellis, 1985; Russell and Wathern, 1993; Clark, 1999).

- c. **Continuing Education and Distance Learning:** In the United Kingdom, several universities have established EIA centres that tailor short training courses to meet the specific demands of the EIA community (Russell and Wathern, 1993; Wood, 1993). Examples of universities with EIA centres include the University of Manchester, The University of Wales Aberystwyth, Oxford Brooks University, and the University of Birmingham. The courses were designed to meet the demand for ongoing professional development and support through training and research (Russell and Wathern, 1993). Courses range from single day courses to three months in duration depending upon the training objectives (Wood, 1993). The course content varied from awareness training to training on specific EIA tasks and project management (Russell and Wathern, 1993; Wood, 1993).
- d. **Postgraduate Certificate Programs:** In Canada, some community colleges offer certificate programs specializing in technical aspects of EIA. Some universities have negotiated joint programs with community colleges as a part of postgraduate studies. The students receive both a university degree and certification as EIA specialists.

- e. **Short Training Courses:** In Canada, the Canadian Environmental Assessment Agency sponsors training workshops on various aspects of the federal EIA process, the *Act* and the *Regulations*. The workshops rotate regionally throughout Canada, and information on workshops, dates and location are available on the CEAA website (<http://www.ceaa.gc.ca/>).
- f. **On the Job Training:** On the job training should disseminate information related to guidelines and handbook procedures produced by the respective programs (Lee, Wood, and Gazidellis, 1985; Canter and Clark, 1997).

#### 2.3.4 Course Content and Training Methods

Course content must be adapted to the target groups. **Table 3** lists the recommended topics that can be included in EIA courses. Awareness training provides a general introduction to many of these topics while substantive training in EIA methods, project management training, and specialized technical training would provide more detailed instruction on specific topics (Organizing Training, 1995).

**Table 3: Suggested EIA Course Content**

• Nature of EIA	• Project management
• History of EIA	• Mitigation of impacts
• EIA law, policy, institutions	• Risk assessment
• Scoping and identifying impact	• Decision-making
• Need for EIA screening	• Monitoring & impact auditing
• Baseline analysis	• Follow-up
• Predicting impacts	• Report writing
• Assessment of significance	• Communication & consultation
• Identifying alternatives	• Improving EIA quality
• Public participation	• Current issues in EIA
• Cumulative effects	

Source: Adapted from Organizing Training, Leaflet Series No. 8 (1995) Brian D. Clark (1999), and David Lawrence (1994).

Training methods should be tailored to meet the objectives and course content. Training should be applied and interactive with opportunities for students to gain practical experience (Organizing Training, 1995; UNEP, 1996; Clark, 1999). Interdisciplinarity, critical thinking, and values awareness are teaching/learning resources that encourage students to think both within and across disciplines (Jones and Merritt, 1999; Jones, Merritt and Palmer, 1999). Critical education in EIA should work towards changing the current patterns of resource use and allocation by making the EIA process more open to opposing views and by gaining input and support of the community (Diduck and Sinclair, 1997; Diduck, 1999).

### **2.3.5 EIA Networks**

Clark (1999) indicated that network building or information sharing in EIA began in Canada in 1994 when FEARO, in collaboration with the International Association for Impact Assessment, sponsored the first International Summit on EIA. Clark (1999) discussed the importance of networks (particularly the Internet) in capacity strengthening for EIA. Through information technology like the Internet, a wide range of information and material can be exchanged among the various groups and stakeholders involved with EIA. More specifically, Clark (1999) promoted the sharing of “data, publications and other information” because it would “allow people to exchange experiences, knowledge, views, ideas and advice.” Clark (1999) concluded by saying that “Use of the Internet could also complement training services and programmes, allowing for greater use of distance learning approaches.”

## 2.5 Comments on EIA Education and Training Needs in Canada

As stated previously, Lee, Wood, and Gazidellis included Canada in their 1985 study on EIA education and training. More recently, the ongoing need for education and research was discussed in conjunction with the 5-year Review of the *Canadian Environmental Assessment Act*. As well, Doyle and Saddler (1996) looked at the Canada-wide application of EIA, and they too commented on EIA training and research.

### 2.5.1 EIA in Canada in the Mid 1980s

The Canadian chapter in the Lee, Wood and Gazidellis (1985) was a literature review with Rigby's *Environmental Assessment in Canada: Directory of University Teaching and Research 1982-83* serving as the key source of information on formal education opportunities in EIA.

Lee, Wood and Gazidellis (1985) applauded Canada for having developed the regulatory requirements for EIA. They further described the federal and provincial regulatory processes for EIA using the Environmental Assessment and Review Process (EARP) and the Manitoba EIA framework as models. Lee, Wood, and Gazidellis (1985) made the following observation regarding EIAs and EIA education in Canada:

- EIAs were criticized for “inventory style descriptions”, vague generalizations, and lack of quantitative information.

- Recommendations for improving the EIA process included developing common standards in the procedures for conducting EIAs, developing guidelines for measurement and evaluation criteria, and clarifying the definitions.
- Growing public interest in EIAs was prompting a demand for social impact assessments (SIA).
- **Target groups:** Environmental professionals were described as having a “high general awareness” of EIA, but managers and technical specialists were deemed to hold a “narrow view” of the EIA process. As a result, administrative authorities (federal and provincial), panel members, consultants and technical advisors, and members of environmental interest groups were identified as those who would benefit from EIA education and training. It was recommended that EIA education be directed towards the “contributing disciplines” such as social sciences, natural resources management, and regional planning.
- **The EIA training needs** included: general awareness training, substantive training in assessment methods, specialized technical training regarding specific impacts, and EIA project management training.
- Training for EIA in Canada depended upon whether participants were engaged in identifying impacts, collecting and analyzing engineering and environmental data, predicting the likely magnitude of environmental impacts, and communicating the findings.

- Canadian universities were also credited for the numerous research publications being generated by respondents.

Lee Wood and Gazidellis (1985) applauded Canadian universities for their commitment to education and research in EIA, and drawing on the Rigby report, the authors described EIA education and training, as it existed in the 1980s:

- Canada was described as “one of the few countries in which it was possible to study EIA as a core subject at both the undergraduate and postgraduate level in universities”. Those opportunities were limited to the universities listed in **Table 4**. For the most part, EIA was not taught as “an end in itself”, but it was offered as an elective course in broader university programs.
- Some universities engaged in EIA related research and offered workshops, seminars and conferences for mature students requiring professional development in EIA. Universities were credited for updating and advancing courses for professional development in EIA.
- Canadian universities offered programs in environmental management and regional planning where the focus was directed at specific environmental impacts. Selected universities specialized in specific environmental related areas. (There was no mention whether EIA courses were included in the programs.)

- The authors concluded that there were numerous opportunities for university training and on-the-job training in EIA, but there was lack of evidence regarding the quality of EIA education and training courses. The authors noted that EIA teaching methods included the use of case studies, role-playing, site visits, and problem solving.

**Table 4** Canadian universities offering EIA - 1980s (Lee, Wood and Gazidellis, 1985).

Universities offering a <b>core program</b> of courses in EIA:
<ul style="list-style-type: none"> <li>• Carleton University (undergraduate)</li> <li>• University of Toronto (undergraduate and graduate)</li> <li>• University of Waterloo (undergraduate)</li> </ul>
Universities offering <b>single EIA courses</b> in broader undergraduate studies:
<ul style="list-style-type: none"> <li>• University of British Columbia</li> <li>• Brock University</li> <li>• University of Calgary</li> <li>• Concordia University</li> <li>• Dalhousie University</li> <li>• McGill University</li> <li>• University of Ottawa</li> <li>• Simon Fraser University</li> <li>• York University (graduate level)</li> </ul>

### 2.5.2 The 1999-2000 Five-Year Review of CEAA

The 1999–2000 Five-Year Review of the *Canadian Environmental Assessment Act* involved a Canada-wide multi-stakeholder consultation that recommended improvements to the federal EIA process. The following comments were directed towards the need for re-vitalizing education and training programs:

- i. EIA education in cumulative effects assessment is needed in the following areas: interpreting the legal requirements for cumulative effects, linking biophysical effects to socio-economic effects, generating baseline data, and providing adequate training material in practical applications (Bruce, 1999).
- ii. Challenges that needed to be addressed by ongoing education and research in EIA include: biological impacts, biological diversity, ecological risk, transboundary impacts, sustainability, climate change and human health (Lawrence, 1999).
- iii. "Insufficient knowledge of the EA processes and the Act are the most frequent barriers to conducting good screenings" (David Redmond & Associates, 1999). Problematic was the distinction between formal and informal training. While some programs had access to qualified EIA specialists, other programs relied on individuals with some form of in-house training. "Formal training" was defined as Agency training or program training (David Redmond & Associates, 1999).
- iv. The accumulation of knowledge and technical expertise within governments (federal and provincial), the private sector, and universities was important, but there also needed to be a central forum for sharing this knowledge and expertise (Lawrence, 1999). Lawrence (1999) drew attention to the need for networking through an EIA Centre.



- v. Training was essential to improving follow-up programs (post assessment activities that verify the effectiveness of a project's EIA in addressing the adverse environmental effects) (Gartner Lee Limited, 1999). Training programs could take the form of Agency sponsored training, program sponsored training or industry sponsored training, and courses could be delivered through workshops, seminars, and conferences (Gartner Lee Limited, 1999).
- vi. Integrating courses for follow-up and monitoring into universities and community colleges was an option in light of the high costs associated with training and the need for technical equipment (Gartner Lee Limited, 1999). Programs offered at universities and community colleges could involve formal accreditation or certification in EIA (Gartner Lee Limited, 1999).

The following summarizes the observations made regarding EIA education and training across Canada:

- There was an ongoing need for interdisciplinary education, training, and research in EIA;
- Formal training referred to Agency or program-sponsored training programs in the application of program specific procedures;
- Universities were considered to be consultative and research oriented rather than a resource for education and training; and

- There was a demand to share technical knowledge and expertise through an EIA centre.

### **2.5.3 EIA: The provinces and territories**

Doyle and Sadler (1996) reviewed the federal, provincial and territorial frameworks for the effectiveness of their respective EIA practices. While there are variations in the progress of provinces to implement all aspects of EIA, comments from the 5-Year Review of *CEAA* applied to the provincial EIA processes as well. More specifically, Doyle and Sadler (1996) made the following recommendations:

- EIA processes and practices needed to be improved in the area of the implementation stages of EIA, monitoring and follow-up, and cumulative effects.
- EIA training, research and professional development needed to be strengthened and coordinated.
- EIA networks needed to be strengthened through a national Canadian EIA centre that would serve as a knowledge base and information exchange.

## **2.6 Summary**

This chapter began with a review of the literature that defined the complex framework for EIA. Doern and Conway (1994) described the political environment that affects EIA while Spaling, Smit, and Kreutzwiser (1993), Lawrence (1994), and Sadar and Stolte (1996) described the technical aspects of EIA. Following that,

Beattie (1995), Fenton and McQueen (1996), Mostert (1996), Sadler (1996), Diduck and Sinclair (1997) and Diduck (1999) described how the democratic nature of EIA provided opportunities for citizens' values to influence development planning, and they described how EIA became a platform for implementing the goals and principles of sustainable development. Finally, Lawrence (1994 & 1997b) advanced the importance of theory building to EIA while Fenton and McQueen (1996) stressed the importance of university led research in EIA.

The chapter went on to establish the relationship between EIA and education. Gibson (1993), Beattie (1995), Sadar and Stolte (1996), Lawrence (1997b), and Greer-Wooten (1997) described the holistic nature of EIA. While the EIA process is multidisciplinary, it requires a holistic interdisciplinary approach to education and training that can best be offered only through innovative formal university education.

Universities were described as the key learning institutions in society. Universities develop the theory and technical knowledge that is passed to the professionals who are eventually involved in the EIA process. Educating for the environment and sustainable development challenged educators to develop teaching methods that bridge the established knowledge domains that have traditionally supported unsustainable economic development paradigms.

Finally, the chapter reviewed the findings of early studies that described EIA education in terms of: who should be targeted, training needs, delivery of EIA courses, course content, training methods and EIA network development. Lee, Wood and Gazidellis (1985) critiqued EIA education in Canada. They identified the

progress that Canadian universities had made with respect to EIA education, and they identified how EIA education and training could be improved. However, EIA education continues to be criticized for not reaching its potential as described by the comments from the 5-year Review of CEAA and by Doyle and Sadler (1996).

The WCED stated that the critical role of education was to shift societies towards sustainable development. Universities have acknowledged society's justifiable concerns over the natural environment and have attempted to address them through education. The role of universities in capacity building for EIA includes developing the theory and methodology for EIA, linking the relevant disciplinary knowledge domains, and providing the programs that target different groups of people with different education needs in EIA. Beyond that, universities must be innovative through research and development that strengthen the EIA process.

## **CHAPTER 3: METHODS**

### **3.1 Overview**

The research design used a qualitative interactive approach. The research methods included a literature review, a review of university course calendars, a survey questionnaire, and participant observation for data collection. The tools used for data analysis included Microsoft® Access2000 and Excel2000 and the ATLAS/ti® qualitative data analysis software.

### **3.2 University Course Calendars**

Unobtrusive research techniques allow the researcher to gather data without directly soliciting information from the research subjects (Babbie, 1995; Punch, 1998; Lee, 2000). This approach was used when considering the Internet as a research tool since the Internet provides open access to easily retrievable information (Lee, 2000). University course calendars provided the initial information regarding courses for EIA education and training at Canadian universities.

The intention in this study was not to analyse the content of course calendars but to point out the location, availability, and types of EIA courses offered at Canadian universities. Generally, university course calendars are a primary source of information for potential students, and students are expected to consult with the program and faculty advisors for further details about programs and courses.

Most Canadian universities can be accessed through the Internet. For this study, online course calendars provided information on the programs, course names and

brief descriptions of the themes addressed. The major advantage was that the websites often linked together courses, programs, identities of professors or course instructors, and the course syllabi. The names of professors, phone numbers, and email addresses were also accessible for easy contact.

A key drawback of using university websites was a lack of uniformity, and therefore, information was both plentiful and limited depending upon the complexity, datedness, and accuracy in website construction and maintenance. Moreover, there was a learning curve involved in using each and every website such that information retrieval was a matter of trial and error.

### **3.2.1 Compiling a Directory of EIA Courses and Programs**

In January 2000, the Canadian Environmental Assessment Agency sponsored an initial study to discover what opportunities existed for EIA training at Canadian Universities. A review of university course calendars provided the initial information as to the EIA courses and programs offered.

The Association of Universities and Colleges (AUCC) at <http://www.aucc.ca>, provides links to the home pages of its 100 member universities and associated colleges. All of the institutions listed with the AUCC were included in the Internet course calendar search.

The study looked for courses being offered at each institution regarding environmental assessment (EA) generally, the *Canadian Environmental Assessment Act* and provincial processes specifically, as well as other aspects of EA such as

cumulative effects, public participation, risk assessment, and technology assessment. Both undergraduate and graduate programs were reviewed for individual EIA courses and core programs in EIA. The programs considered in the study included Geography, Ecology, Biology, Zoology, Environmental Studies, Environmental Science, Sociology, Law, and Engineering. If it was determined that other programs offered EA courses, those programs were also included.

The results of the Internet survey were compiled into a directory – *Environmental Assessment: Directory of Environmental Assessment Courses at Canadian Universities*. The directory is a compendium to this thesis. The universities offering EIA courses were listed alphabetically. The directory included such information as programs or faculties, the degrees awarded, and course descriptions as they appeared on the website. Other relevant information pertaining to a course included the respondents' names and recommended reading materials. In some cases, the course syllabus and more detailed course information was included.

### **3.2.2 Analysis of the EIA Course Directory**

The EIA course directory was intended to document the existing opportunities for EIA education and training at Canadian universities. In conjunction with this, the literature review provided the background needed to comment on the EIA education and training programs. Using information from the literature review, it was possible to distinguish between university course offerings:

**Core Programs** – The universities offering a cluster of EIA related courses at undergraduate and graduate levels for professional development as EIA specialists (Russell and Wathern, 1993; Clark, 1999)

**Specialized training** – A technical command of particular impacts, siting of major facilities, or specific EIA issues such as cumulative effects, risk assessment, traditional ecological knowledge, social impact assessment, and strategic environmental assessment.

### **3.2.3 Limitations of Evaluation Criteria**

Babbie (1995) stated that subjective analysis is based on the individual's experience, background and knowledge of an object or phenomenon. On two occasions, the discretion of the researcher was used to analyze course calendars. First, the course calendars offered a brief description of the subject matter covered by the course. The length of the description can be as short as one sentence. Nevertheless, the course types were assigned using the discretion and experience of the researcher in interpreting the brief descriptions.

Second, a variety of titles are used to describe university programs. Some program names are generally consistent across universities while other universities are uniquely titled. The traditional disciplines include biology, chemistry, geography, law and sociology. To simplify discussions, it was necessary to standardize the naming of other programs. For example, urban studies, urban planning, land use and planning, and urban and rural planning are referred to as "planning", and civil, chemical, and environmental engineering are referred to as "engineering".



### 3.3 Literature Review

A search was conducted for literature that established the need for formal EIA education, training and research, and that identified the essential characteristics important to EIA that could only be addressed within the scope of higher education. The University of Manitoba and University of Winnipeg library systems and the Internet were used to search for studies that related to formal EIA education. The Canadian Environmental Assessment Agency (CEAA) provides Internet links to EIA centres around the world. The EIA Centre at the University of Manchester and the International Association for Impact Assessment, through the respective websites, provide reference lists to books, journals, and research papers dealing with EIA education, training and research. The EIA Centre at the University of Manchester specializes in EIA training, and publishes newsletters and a leaflets series on EIA training that can be accessed through the Internet. Members of the thesis committee also recommended articles and publications.

Articles by Lee, Woods, and Gazidellis (1985) and Clark (1999) were used to define the groups that benefit from EIA education, training needs, and programs best suited to delivering EIA instruction. The Lee, Wood, and Gazidellis (1985) review of EIA training at Canadian universities served as a point of comparison as to the progress in program development since the mid 1980's.

EIA challenges the way we think about development; therefore, the literature review looked for articles that addressed new approaches to higher education such as interdisciplinarity, critical thinking, and value awareness. This served as a foundation

for questions in sections II and III of the questionnaire. This information was used to analyse the current trend in teaching methods in EIA course.

### **3.4 Interviews**

A wide range of documents and other forms of communication media are useful sources of data to social researchers (Babbie, 1995; Punch, 1998). Punch (1998) stressed how documentary data combined with other research techniques such as interviews and surveys add depth to a research topic. In Lee (2000), this concept was defined as triangulation or “the use of multiple data collection methods with the aim of compensating for the weakness of particular methods by drawing on the strength of others”.

Triangulation allows the researcher to add depth to a study by combining several research techniques. In qualitative research, the interview is an appropriate technique for information gathering in descriptive studies where individuals are the unit of analysis (Babbie, 1995). A questionnaire was developed and administered via a telephone interview with EIA educators. The purpose of the survey was to gain a better understanding of EIA course content, teaching methods, and support for formal EIA education.

#### **3.4.1 The Questionnaire**

A questionnaire was developed using information from the literature review, the calendar review, and input from the thesis advisory committee. A copy of the questionnaire is included in **Appendix B**. The instrument consisted of 14 questions

that were grouped into four sections. Each section was designed to solicit information on different aspects of EIA courses as follows:

**Section I:** This section identified the disciplinary background of students who take EIA courses, and it explored whether or not students were actively recruited into the course(s).

**Section II:** This section related to (a) specific information regarding EIA course professors: programs taught, years teaching EIA, and research activities, and (b) details about the EIA course(s). The detailed course questions were designed to describe course content, teaching methods, and material used in the classroom. The results would provide a profile of formal EIA education in Canada.

**Section III:** The open-ended questions in this section addressed how the respondents bridged the disciplinary boundaries in relating EIA to the real world application of EIA. The questions were formulated from literature that described EIA education be interdisciplinary.

**Section IV:** This section related to the materials and programs that supported professors in their roles of EIA educators. The questions were open-ended, thereby giving respondents latitude to share comments and concerns in each topic area.

The interview was semi-structured and informal. It included a combination of questions that required a standard response and those that were open-ended. Merriam

(1998) cautioned against using Yes/No questions because they limit the information gathering process. In this research project, there was limited use of Yes/No questions. The open-ended questions allowed the respondents to supply their own answers rather than limiting the interviewees with a list of preset alternatives that solicited a particular response (Foddy, 1993; Babbie, 1995; Merriam, 1998).

The questionnaire was pre-tested with three respondents to determine if the respondents had any difficulties in understanding or responding to the questions. After each test, changes were made to improve the clarity of the questions.

#### **3.4.2 Identifying EIA Educators**

Respondents associated with EIA courses were selected non-randomly through: (a) the course calendars and university websites, and (b) a snowball approach in which the thesis committee provided names of initial respondents, who were then asked to identify other potential respondents. It was agreed with the thesis committee that a maximum of 20 respondents from different institutions be contacted, and twenty-one (21) respondents were interviewed for this study. All of the respondents contacted agreed to participate in the interview.

Since EIA courses are offered by a diversity of programs and faculties, an attempt was made to interview individuals from varying programs. Also, an attempt was made to contact respondents in each Canadian province. Participation in this study depended upon the accessibility and availability of respondents.

The respondents were contacted by telephone to discuss their participation in the interview. A standard greeting introduced the researcher, stated the purpose of the call and the intent of the research, and confirmed an appointment for the interview. Prior to conducting the interview, an introductory statement was read providing more details about the purpose and objectives of the study and the ethics approval for the study. A copy of the introductory statement is included in **Appendix C**.

The time allowed to respond to the questionnaire was 35 minutes, and most interviews were done within that time frame. The shortest telephone interview was 17 minutes; the longest was 56 minutes. Respondents were willing to spend additional time talking about EIA issues beyond the time allotted for the survey itself.

Twenty-one (21) EIA course respondents were interviewed, and they provided the details for twenty-four (24) EIA courses. Three respondents taught both introductory and advanced courses in EIA. Five (5) EIA courses were graduate level courses and nineteen (19) were undergraduate level courses. Once the data from the interviews were analyzed and the results documented, the results were sent to the participants.

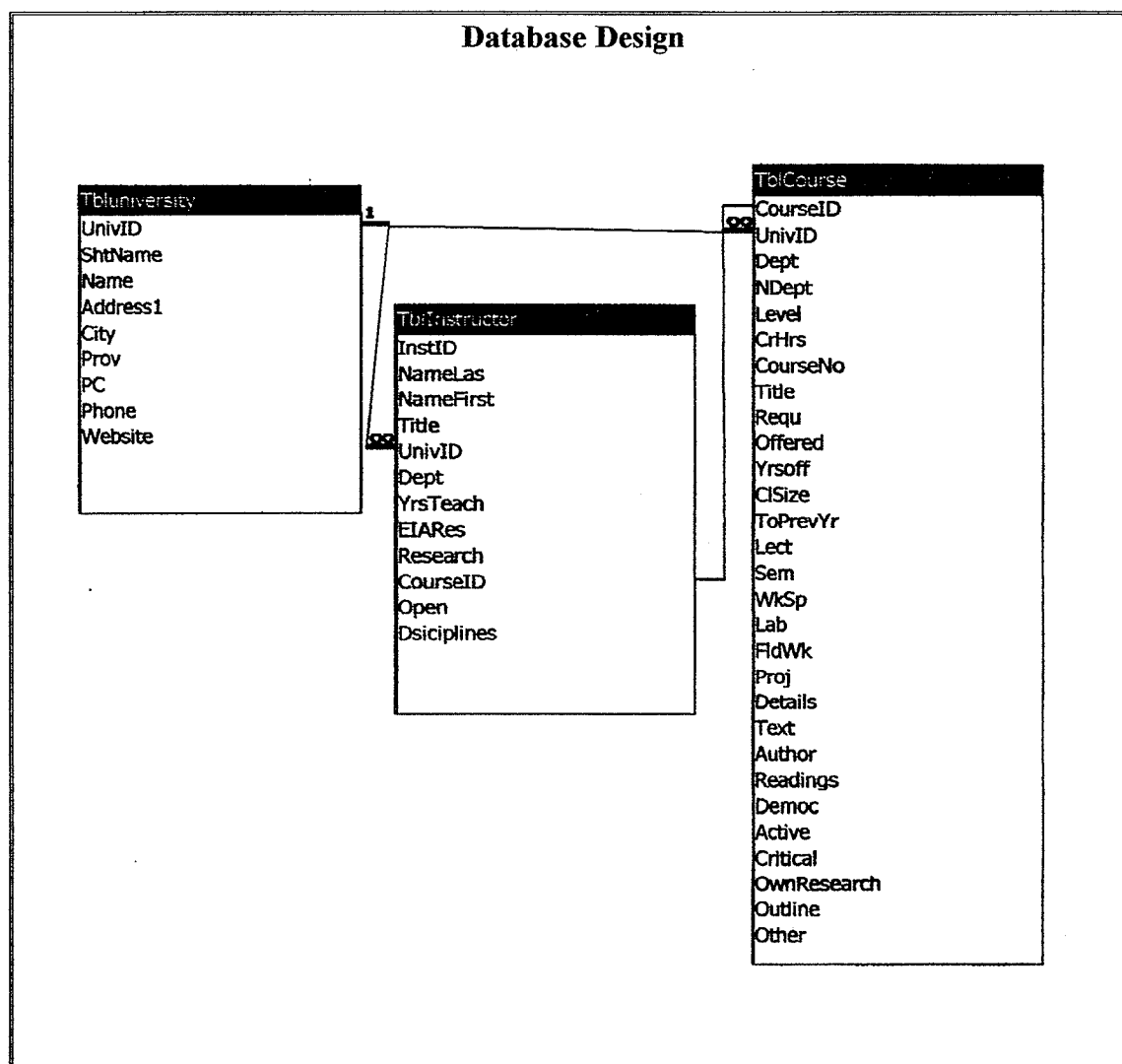
### **3.4.3 Analysis of Questionnaire Results**

The goal of qualitative research is to gain an insight or an understanding of a situation (Merriam, 1998). Each section of the questionnaire was designed to address different issues relating to EIA course offerings, content and teaching methods. The semi-structured nature of the interviews precluded using formal statistical analysis; therefore, a qualitative approach was used for data analysis (Babbie, 1995). The more

structured information and results were compiled using Microsoft® Access 2000 database software. For the most part, Atlas/ti® qualitative data analysis software was the tool selected for the textual analysis of the questionnaire results.

After the telephone interviews, the results of each survey were transcribed into Word documents. Then a database was designed to compile the formal or structured data from the course calendars and the survey responses. The database design of related tables and data fields is depicted in **Figure 4**. The data fields in the university table related to the *Environmental Assessment Directory of Environmental Assessment Courses at Canadian Universities*. The data fields in the instructor table and course table related to the questionnaire for this study. After the raw data were entered into the database, they were analysed for trends and patterns by (a) a series of queries or (b) by exporting the data into a spreadsheet for further analysis.

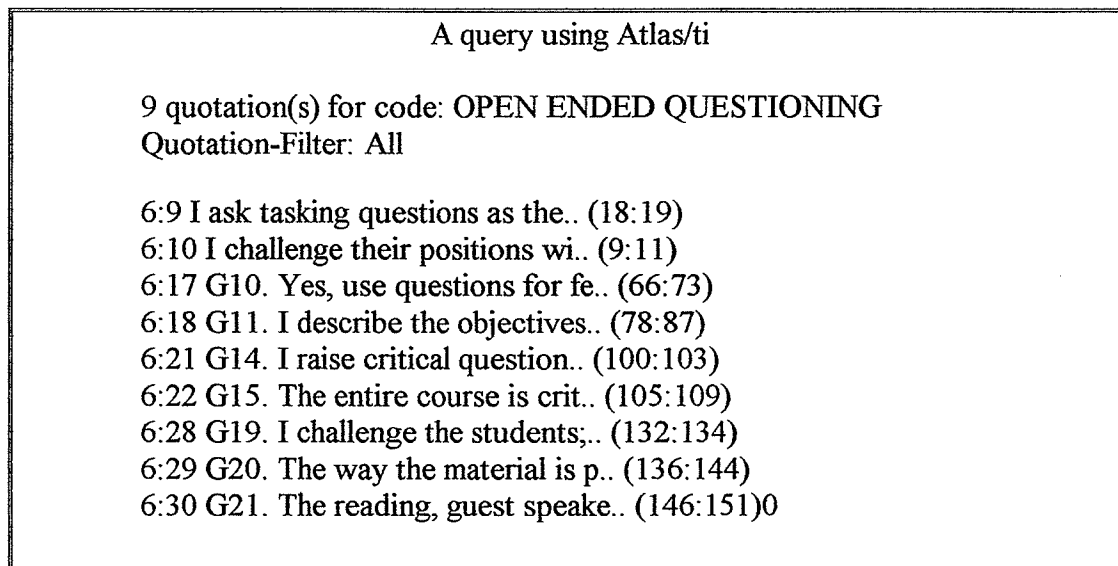
The next step dealt with the open-ended questions: question 4(b) parts 9,11,12 and 13, questions 5, 6, 7, 9, 10, 11, 12,13, and 14. The responses for each question were aggregated by topic into 12 text documents as follows: disciplines and recruitment, research activities, themes, active and interactive, critical thinking, multidisciplinary, broader worldview, cooperation EIA agencies, cooperation industry, professional development, and Q14 comments. Then, the 12 text documents were imported into the Atlas/ti qualitative data analysis software.



**Figure 4.** The database design included 3 tables and their related fields.

The Atlas/ti software was used to select data segments (quotations), to code the segments, create memos, and build families of codes and memos based on what was discovered through the literature review and related themes emerging from the primary data. For example, according to the literature, the methods that promoted critical thinking in the classroom were using case studies, critical teaching, evaluating available evidence, open ended questioning, and questioning fundamental methods.

These became codes, and the primary documents were scanned for statements that applied to each of the codes. **Figure 5** demonstrates the use of a query on the coded “open ended questioning”. There were nine quotations for this coded. The quotations can be printed in full or in the abbreviated form in this example.



**Figure 5.** A query using ATLAS/ti

### 3.5 Participant Observation

Personal experience in EIA courses proved most beneficial to my understanding of how courses are organized such that it supplemented the discussions on the results from this study. I participated in the following formal EIA courses and informal EIA training programs:

- January – April 2000: Environmental Impact Assessment (Natural Resources Institute, University of Manitoba).
- February 8-9, 2000: Cumulative Assessment Training (Canadian Environmental Assessment Agency).



- May 13-18, 2001: Applied Environmental Impact Assessment (Natural Resources Institute and Environmental Science Program, University of Manitoba).
- January 15-17, 2002: Screening Under the *Canadian Environmental Assessment Act* (The Canadian Environmental Assessment Agency).

With this research project in mind, I took notes during my participation in the above noted courses. The notes helped me develop the questionnaire and they were useful for discussing the results from this study

### **3.6 Summary**

Literature, university course calendars, interviews with professors teaching EIA courses and my participation in EIA courses provided the basic information and raw data for this project. This study used a qualitative approach for data analyses. The tools used to analyse the data were qualitative data analysis software, database software and spreadsheets.

## **CHAPTER 4: FORMAL EIA EDUCATION AT CANADIAN UNIVERSITIES**

### **4.1 Overview**

The research for this study was conducted in two stages. The first was a review of university course calendars that identified undergraduate and graduate level EIA courses and programs offered at Canadian universities. This chapter presents the results of the course calendar search, a broad overview of EIA courses offered by forty universities. The second stage involved interviews with selected professors teaching formal EIA courses. Hence, the chapter continues with a more detailed examination of EIA courses using the information supplied by the respondents. The EIA courses are described in terms of how they are offered, course content, teaching methods, and training materials used in the classroom. The chapter goes on to investigate student interest in EIA courses in terms of student background and recruitment. Next, the chapter describes EIA respondents' research activities, years teaching EIA and support for professors in their roles as EIA educators.

### **4.2 Canadian Universities and EIA**

By the mid 1980's, approximately a dozen Canadian universities had incorporated EIA courses into their programs, and Lee, Woods, and Gazidellis (1985) praised them for their contributions to EIA education. The number of universities offering EIA courses has since increased.

This study identified 40 Canadian universities that offer undergraduate and graduate level EIA courses. The universities and programs are identified in **Table 5**.

**Table 5** Canadian universities offering EIA courses. Level refers to undergraduate degree (UG), graduate degree (G), diploma (D), or certificate (C) programs offered by the identified programs.

Universities	Level	Program
Acadia University	UG	- Environmental Science
University of Alberta	UG	- Engineering (Civil, Chemical, Environmental)
University of British Columbia	UG	- Geography - Engineering - Law
Brock University	UG	- Environmental Policy Institute
University of Calgary	UG	- Environmental Science
	G	- Environmental Design & Planning - Energy and the Environment
University College of Cape Breton	UG	- Environmental Technology
Carleton University	UG	- Geography & Environmental Studies - Technology, Society, Environment - Engineering
Concordia University	UG	- Geography
	G (D)	- Environmental Impact Assessment
Dalhousie University	UG	- Engineering
	G	- School for Resource & Environmental Studies - Urban and Rural Planning
University of Guelph	UG	- Geography - Environmental Science
	G	- Geography - School of Rural Planning & Development
King's University College	UG	- Environmental Studies
Lakehead University	UG	- Geography & Environmental Studies
	C	- Environmental Impact Assessment
University Manitoba	UG	- Environmental Science - Engineering - Land Use and Planning
	G	- Natural Resources Institute
University of Lethbridge	UG	- Environmental Science
McGill University	UG	- Faculty of Agriculture & Environmental Science
McMaster University	UG	- School of Geography & Geology
	D	- Environmental Health
Memorial University of Nfld.	UG	- Environmental Science - Engineering
	G	- Geography
University of Montreal	UG	- Geography
	G	- Geography - Institute of Urban Planning
University of New Brunswick	G	- Engineering
University of Northern British Columbia	UG	- Natural Resource & Environmental Studies
	G	- Environmental Studies
Nova Scotia Agricultural College	UG	- Agricultural Environmental Studies
Okanagan University College	UG	- Earth Science & Environmental Science
University of Ottawa	UG	- Geography & Environmental Science
University of Quebec Montreal	G	- Institute of Environmental Science
Queen's University	UG	- School of Environmental Studies
	G	- School of Urban Planning
University of Regina	UG	- Environmental Systems Engineering

Table 5 Cont'd	
Ryerson Polytechnic University	UG - School of Occupational Health - School of Urban & Region Planning
Saint Mary's University	G - Environmental & Applied Science UG - Environmental Studies - Sociology
University of Saskatchewan	G - Agriculture & Bio-resource Engineering
University of Sherbrooke	UG - Geography G - Environment
Simon Fraser University	UG - Resource & Environmental Management G - Resource & Environmental Management
University of Toronto	UG - Environmental & Resource Management - Geography G - Geography
Trent University	UG - Environmental & Resource Studies - Environmental & Resource Science
University of Victoria	UG - School of Environmental Studies
University of Waterloo	UG - Program of environment & Resource Studies - Engineering G - Geography
University of Western Ontario	UG - Geography
Wilfred Laurier University	UG - Geography & Environmental Studies G - Geography & Environmental Studies
University of Windsor	UG - Geography & Environmental Resource Mgmt - Environmental Engineering
University of Winnipeg	UG - Environmental Studies
York University	UG - Faculty of Environmental Studies G - Faculty of Environmental Studies

The first draft of the course directory was completed in March 2000, and it was updated during the interview process. Although a few universities offer EIA courses through continuing education programs, those courses were not included. The key features of EIA courses considered in this study are the following:

- EIA was mostly offered as a single course under the title "Environmental Impact Assessment" or "Environmental Assessment." Some Natural Resource Management programs included EIA as a topic under one of many tools covered in the courses material. Only 4 courses offered instruction in Social and Economic Impact Assessment. In terms of specialty courses, Risk Assessment was more often offered in Engineering

programs. There were no courses on cumulative effects assessment or traditional ecological assessment.

- EIA courses were generally undergraduate courses offered at the third or fourth year levels of study.
- As a rule, EIA courses had prerequisite requirements. The prerequisites varied, but for the most part, students were expected to have a first or second year standing in environmental studies, geography, natural sciences courses like biology, ecology or chemistry or permission of the program chair or instructor.
- EIA courses were generally offered as elective courses, not as major requirements for the degree offered. It was common to find EIA courses cross-listed with other programs or faculties. For example, if one of Geography, Environmental Studies/Science or Planning offered an EIA course that course was cross-listed with the other programs including Engineering Programs.
- Extrapolating from the university course calendars, a generic EIA course description included elements of the following: *Interdisciplinary approach to the principles, practices, and methods for federal and provincial EIA processes. Survey of methods that cover screening, scoping, baseline studies, impact predictions, mitigation, monitoring, and auditing. The course examines critically the effectiveness of public participation and*

*EIA in the decision-making process. Other issues include an introduction to cumulative effects assessment, and strategic impact assessment.*

- EIA courses offered by engineering programs specifically focused on the siting of large-scale facilities: hazardous waste facilities, mining and hydro operations, and waste treatment plants. Some programs also offer a course on Risk Assessment.
- For the most part, environmental/natural resources programs specialize in theme areas such as watershed management, coastal zone management, forestry, and environmental remediation to name a few. While sustainability, environmental protection, and risk perception are promoted, EIA is not necessarily offered as part of the course curriculum.
- There are examples where EIA has been removed from degree programs and added to non-degree or certificate granting continuing education programs. For example, the University of Alberta offered EIA as part of the Environmental and Conservation Science Degree Program. Now the university offers EIA as a 3-day elective course in the Environmental Resource Management Certificate Program, Faculty of Extension.
- Only three universities (Waterloo, Concordia, and Lakehead) offered a suite of EIA related courses for students interested in specializing in EIA, and those universities are discussed in the next paragraph.

Lee, Wood and Gazidellis (1985) ascertained that three Canadian universities (Carleton, Toronto, and Waterloo) offered a concentration or core of courses specifically related to EIA. Since the mid 1980's, changes have taken place with respect to the number of programs that offer areas of concentration in EIA and what they offer. Examples of some key changes include the following:

- **Concordia University** – Concordia now offers a graduate diploma program in Environmental Impact Assessment. Compulsory courses include EIA Concepts, Principles and Practices and Research Methods in EIA. Students have the option of selecting electives from a body of courses in the following areas: Social, Economic, and Legal Environment and Biophysical Environment. Finally, students have the option of 6 credits hours from: Internship in EIA, Selected Topics in EIA or a Research Paper.
- **Lakehead University** – Lakehead University offers, as a part of their Distance Education Program, a Certificate in Environmental Assessment. The courses include: Introduction to Environmental Studies, Introduction to Environmental Assessment, Assessment of Biophysical Environmental Impacts, and Environmental Impact Assessment in Hinterland Areas.
- **Ryerson University** – Ryerson offers a Masters of Environmental Applied Science and Management with a body of courses that include Environmental Law and Policy, Environmental Economics, Environmental Assessment, Risk Assessment in Environmental

Management, Environmental Management Systems, Decision Making and Strategic Planning in Management, and Geographic Information Systems for Environmental Management. Also, Urban and Regional Planning offers within its program the following body of courses: Environmental Planning, Environmental Impact Assessment, Selected Topics in Environmental Health, and Facility Siting and Environmental Assessment.

- **University of Waterloo** – The Faculty of Environmental Studies offers a program for students looking to specialize in EIA. The first and second year courses provide the necessary foundation for students to study EIA specifically. The three EIA courses are progressive. Students are introduced to the broader aspects of EIA, they build on the practical application of EIA, and they learn to link EIA to broader planning issues. The courses include Introduction to Environmental Assessment, Environmental Monitoring, Biophysical and Socio-Economic Impact Assessment and Impact Assessment Planning and Design. The Faculty also offers a Joint Certificate Program with Niagara College where students can concurrently complete the ERS major requirements and a Niagara College certificate in Environmental Assessment.
- **Carleton University, York University, University of Calgary, University of Northern British Columbia and the University of Toronto** offer programs that concentrate in theme areas where the focus is not on EIA specifically, but EIA is included in related courses to Natural Resources Management or Urban Planning. These universities offer one or



more EIA courses, Introductory and Advanced EIA, Environmental Site Assessment, or Product and Technology Assessment. The focus is not specifically directed towards EIA specialization.

### 4.3 EIA Courses

#### 4.3.1 Undergraduate and Graduate Courses at Canadian Universities

The twenty-one respondents interviewed in this study represented seventeen of the forty universities identified in the course calendar review. These respondents also represented eighteen of the fifty-one programs identified in **Table 5**.

##### *i. EIA Major or Elective*

Respondents identified 24 EIA courses: 19 undergraduate level courses and 5 graduate level courses. The EIA courses are summarized in **Table 6** by whether they are a major requirement for a degree or an elective in the program offering the course. Elective courses are optional courses; they are not program requirements. Students choose elective courses based on interest and the sole purpose of broadening their knowledge base.

**Table 6:** EIA as a major requirement or elective.

Level of Study	Major Requirement	Elective	Both
Undergraduate	4	7	8
Graduate	2	3	—

At the undergraduate level the following reasons were given as to why EIA courses were “both” (major requirement or elective):

- The EIA courses were cross-listed between programs. EIA courses were major requirements for a Geography/Environmental Resources major but not for Environmental Science.
- The EIA course(s) were required for Environmental Resources Management majors but not for majors in Geography, Environmental Studies or Environmental Science. Again, the EIA courses were cross-listed between programs.
- The EIA courses were a requirement for an EIA certificate program offered jointly with community colleges but not for other degree majors.

At the graduate level, two (2) EIA courses were identified as major requirements. Of those two courses, one (1) course was under review for a future change to an elective course. The second EIA course was a major requirement for a graduate EIA Diploma Program.

The demarcation between the graduate and undergraduate level courses was not rigid because of the limited availability of EIA courses. In two cases, graduate level students could enrol in undergraduate level EIA courses, and in one case, senior undergraduate students were welcome to participate in a graduate level EIA course. Other courses in this study revealed the following distinctive characteristics:

- One undergraduate course was a 1-week field course that focused on the practical application of EIA. Students completed an EIA case study in the one-week time frame.
- Three EIA undergraduate courses made up a series of courses that were mandatory for students pursuing a joint EIA certificate between university and community college. At the same time, these courses were considered electives for the degree programs. The advanced courses in the series of 3 courses involved hands-on involvement in a case study.
- One graduate-level EIA course is a major requirement in the EIA diploma program at Concordia University.

## *ii. Frequency of Course Offering and Class Size*

The EIA courses are offered every year at both the graduate level and undergraduate level with the following five exceptions at the undergraduate level:

- Two courses were offered **twice** a year because of student demand and high enrolment.
- Two courses were offered alternative years.
- One previously discontinued EIA course was revived due to student demand for the course.

Enrolment levels in this study averaged 51 students per year for the 19 undergraduate courses surveyed in this study. That translated into approximately

2,550 students per year for the 50 undergraduate courses identified across Canada.

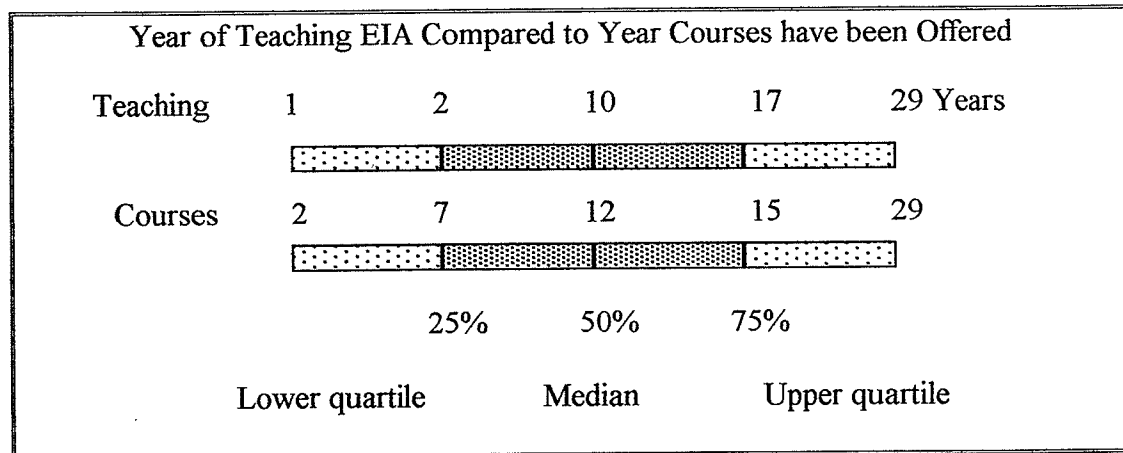
Two courses reported high enrolment numbers (an average of 210 and 145 students per year) as compared to the other courses surveyed. When the extreme numbers were eliminated, the number of students in 17 undergraduate level courses averaged 36 students per year or 1,800 ( $36 \times 50$ ) students enrolling in EIA courses per year in Canada. What is important is that enrolment in EIA courses was either steady or increasing, and the courses were offered every year. Furthermore, there were two cases where EIA courses were offered twice a year, and there was one case where student demand revived an EIA course.

According to Respondent No. 3, there are fewer students enrolled in graduate studies as compared to undergraduate studies. Enrolment in graduate level EIA courses averaged 18 students per year based on 5 graduate level courses or approximately 415 students per year based on approximately 23 graduate courses across Canada. The numbers were down in two courses and up in two courses. The fifth course was in the second year of offering, so it was too soon to comment on the numbers. Thus far, approximately 20 students per year have enrolled in that class.

### *iii. Years EIA Courses Offered and Years of Teaching EIA*

The number of years that EIA courses have been offered and the number of years that the respondents have been teaching the courses were compiled for comparison in **Figure 6**. The EIA courses covered in this survey ranged from as recent as two years old to as old as 29 years. For the 21 respondents interviewed, the

minimum number of years identified teaching EIA was one and the maximum was 29 years.



**Figure 6:** Number of years that respondents have taught EIA courses as compared to the number of years the courses have been offered based on 21 respondents teaching 24 EIA course.

Three of the respondents teaching EIA were either in the process of completing their doctoral degrees, or they had just completed their doctorate. One respondent had more than 10 years experience and involvement with EIA, but only two years with teaching EIA. This respondent volunteered to teach the course because of a student demand for an EIA course at the university. Another respondent had been teaching EIA at the university level for 4 years, but this person had 20 years of experience and had taught EIA in the public sector for 16 years.

The majority of respondents in this study have a history with EIA. They have been teaching EIA, and practicing EIA through consulting or casework, and, as will be discussed later in this chapter, they were actively engaged in EIA research.

### 4.3.2 Course Content

Respondents were asked to identify the themes or EIA topics taught to their students. Because EIA is such an extensive field, the respondents highlighted main topics areas, but they by no means identified all of the themes addressed in their course(s). For this reason, they were asked to supply a copy of their courses outlines.

**Table 7** lists the themes in order of the frequency that they were mentioned.

**Table 7.** EIA course content.

Theme	Theme
1. EIA methods	9. EIA and sustainable development
2. Cumulative effects	10. Strategic environmental assessment
3. Legal and political aspects of EIA	11. Alternatives analysis
4. EIA procedures	12. Emerging issues in EIA
5. Public participation	13. Biological/ecological impacts
6. Social impact assessment	14. EIA and planning
7. Principles and practices	15. Risk assessment and management
8. History of EIA	16. Report writing

For simplicity, “EIA methods” grouped together screening, scoping, identifying and predicting impacts, baseline analysis, assessment of significance, and monitoring and follow-up. “Emerging issues” included topics such as traditional ecological knowledge, EIA and ISO 14001, technology assessment, EIA in broader management planning, and capacity building for EIA in developing countries.

Legal and political aspects of EIA, EIA methods, EIA procedures, principles and practices, public participation and cumulative effects were prevalent themes identified. Other prevalent themes included social impact assessment, strategic environmental assessment, and the relationship between EIA and sustainable development. There did not appear to be a distinction in themes covered between

undergraduate and graduate level courses. The difference lay in EIA courses that were specifically methods oriented where students were required to work on case studies or projects outside the classroom versus courses that were process and theory oriented.

EIA respondents admitted that students were introduced to a small part of EIA. On closer examination of the EIA courses in this study, the respondents covered a vast amount of material in their courses, which might explain why students are only introduced to the various EIA topics.

The course instructors provided 20 course outlines. Eleven (4 graduate, 7 undergraduate) outlined the course topics that were to be discussed each week. The courses run for 12 to 13 weeks. The weekly topics from both undergraduate and graduate courses were summarized into the generic course outline in **Table 8**. The order of the topics varied, but the key variation among the outlines depended upon the number of classes devoted to teaching EIA methods.

Typically, course material ranges from the history of EIA through the major EIA topic areas to new and future developments in EIA. From personal experience, students received a broad introduction to a wide variety of EIA topics. The extensive amount of material prohibits an in-depth study of EIA topics other than through a major class assignment. Respondents offered suggestions on how educating for EIA might be expanded and improved, and their comments are presented in Chapter 5.

**Table 8 A generic course outline**

<b>Week</b>	<b>Topics</b>
Week 1	<ul style="list-style-type: none"><li>▪ Introduction of course</li><li>▪ Context of EIA and definitions</li></ul>
Week 2	<ul style="list-style-type: none"><li>▪ History of EIA</li><li>▪ Legal requirements for EIA – federal</li><li>▪ Principles and practices</li></ul>
Week 3	<ul style="list-style-type: none"><li>▪ Legal requirement for EIA – provincial</li><li>▪ EIA procedures</li><li>▪ EIA and planning</li></ul>
Week 4	<ul style="list-style-type: none"><li>▪ EIA process and methods</li><li>▪ Scoping and terms of reference</li><li>▪ Identifying impacts</li><li>▪ Predicting impacts</li><li>▪ Biophysical assessment</li></ul>
Week 5	<ul style="list-style-type: none"><li>▪ Methods continued</li><li>▪ Baseline data</li><li>▪ Alternatives analysis</li></ul>
Week 6	<ul style="list-style-type: none"><li>▪ Identification and assessment of environmental effects</li><li>▪ Risk assessment</li><li>▪ Needs analysis</li><li>▪ Class assessment (Ontario)</li></ul>
Week 7	<ul style="list-style-type: none"><li>▪ Exam or project presentation</li></ul>
Week 8	<ul style="list-style-type: none"><li>▪ Mitigation and follow-up</li><li>▪ Evaluation of significance</li><li>▪ Report writing</li></ul>
Week 9	<ul style="list-style-type: none"><li>▪ Strategic Environmental Assessment (SEA)</li><li>▪ Cumulative effects assessment</li><li>▪ Case studies/guest speakers</li></ul>
Week 10	<ul style="list-style-type: none"><li>▪ Public consultation process</li><li>▪ Public hearings process</li><li>▪ Case studies/guest speakers</li></ul>
Week 11	<ul style="list-style-type: none"><li>▪ EIA and sustainable development</li><li>▪ EIA in developing countries</li><li>▪ Limitations and future of EIA</li><li>▪ Traditional Ecological Knowledge</li></ul>
Week 12	<ul style="list-style-type: none"><li>▪ Class presentations</li><li>▪ Wrap-up</li></ul>



### 4.3.3 Teaching Methods

Educating for EIA should be interdisciplinary (Jorjani & Dyer, 1996), and state-of-the art EIA education should promote sustainable development by employing a holistic approach to teaching and learning (Bosselmann, 2001). This section looks at how respondents structure their classrooms for teaching and learning about EIA.

#### *i. Democratic*

A class is democratic when students are proactive, and they have the opportunity to shape their own learning experience by having input in how the course unfolds (Bosselmann, 2001). Ten (10) respondents answered “No” to the question “are students involved in the course design in any way.”

The five respondents who replied “yes” characterized student input as the ongoing discussion between the instructor and student in self-directed projects, as characterized by the following statement:

*Students select the aspects of EIA that they choose to review and they choose their material.* Respondent No. 4

Several respondents indicated that their EIA courses were democratic based on course evaluations completed at the end of the course. Course delivery was not modified to students’ needs at the onset of classes, and one respondent admitted that he modified his course based on students’ post university experiences as follows:

*The course is modified based on ongoing discussions with past students who contact me after graduation. How is what I taught you useful to what you are doing now?* Respondent No. 15

## *ii. Active and Interactive*

Teaching for sustainability requires that educators move away from traditional teaching methods by incorporating methods that stimulate active learning and critical thinking (Bosselmann, 2001; Ikuenobe, 2001). For the most part, respondents combined teacher-led lectures with other teaching methods that included seminars, workshops, laboratories, fieldwork and projects **Table 9**.

**Table 9.** Teaching methods in EIA.

Level of study	Course	Lecture	Seminar	Workshop	Lab	Fieldwork	Project-Based
Graduate level	5	4	5	2	-	-	1
Undergraduate level	19	19	11	5	2	4	6

The majority of respondents used a mix of teaching methods for their EIA courses. Only three of the undergraduate courses were taught solely by lecture, and it did not appear that class size was a factor because a combination of lecture and other teaching methods were used in classes of greater than 40 students. For example, in a class of 145 students, the teaching methods combined 3 hours of lecture and project work. Additionally, the applied EIA courses combined the following: "lecture, seminar workshop, fieldwork, site visits, data collection, and literature review."

Respondents were asked "how" they made their classes active and interactive, and their responses were categorized according to the teaching methods described by Jones and Merritt (1999) and Robson (1999). The four categories identified were Socratic teaching, role-playing, student led discussions, and group collaboration.

Socratic teaching methods involve a process of open-ended questioning, and three respondents indicated that they used Socratic teaching methods. For example, one respondent stated:

*The students are given a subject and I entertain comments and direction from the students and they map out the topic area. I ask, "are there limits" in the belief that there are limits and assuming there are limits, what does that have to do with the EIA and what are the consequences. The responsibility is on the student.* Respondent No. 15

Three other respondents assigned their students projects that involved role-playing. One of them described the benefit of role-playing as follows:

*The students role-play as the proponents and member from the various social and economic sectors, so there is opportunity to challenge the EIA process.* Responded No. 6

With "student led discussions," students take the lead role in delivering and discussing topics. Several respondents agreed with the following statement:

*I use exercises, problems, and group work where the students deliver and suggest outcomes. There are individual presentations required from the students as we move along from topic to topic. A pertinent case study is selected and somebody will discuss it.* Respondent No. 20

Finally, one-third of the respondents identified "group collaboration" as a method of making the classroom active and interactive said the following:

*I get students to think about topics in small group settings, and then I have them present their findings.* Respondent No. 1

### *iii. Critical Thinking*

Classes that are active and interactive provide greater opportunity for students to collect, analyze, and reflect critically on information, particularly with respect to teaching and learning about knowledge domains as they relate to sustainable development (Ikuenobe, 2001). Respondents were asked “how” they attempted to get students to think critically about EIA issues. Nine respondents replied, “I teach it critically.” As one respondent (Respondent No. 17) stated, “I teach EIA from a critical point of view with a social theory perspective on environmental planning and policy” More specifically, six respondents stated that they used real case studies, or they assigned class projects in the following ways:

*I bring up issues and problems that I have encountered, for example, a case study with a pulp mill and how the proponent tried to interfere. I get the class to weigh objectivity versus advocacy and contrast them with views of community interest. Respondent No. 5*

*The course requirement is to choose an EA and talk to the proponent, citizens' groups, and government agencies to get their perspectives and determine what the student thinks about it and what can be done better. Respondent No. 7*

The balance of responses was categorized according to Ikuenobe's, (2001) recommendations: Socratic teaching methods, evaluating available evidence, and questioning fundamental methods. Respondents used one or more of these methods to encourage critical thinking in the classroom. Nine responses related to the use of Socratic teaching methods. Examples of comments included the following:

*I challenge their (students) positions with counter proposals. I try to get them to think critically about the dominant development paradigm.*

Respondent No. 1

*I challenge the students as to what the indicators are and how they would apply the indicators, and then I challenge their responses.* Respondent No. 19

Eleven respondents stated that they provided students with the criteria for analysis, and they encouraged their students to evaluate, question, and analyze the available evidence against the criteria. For example,

*The class is given a set of principles; this provides the critical base to use for a critique of EIA.* Respondent No. 13

*The lectures are geared towards analysis. I lay out the normative criteria, and the class evaluates and analyses against the criteria. I move from theory to normative to analytical to application.* Respondent No. 6

Eleven respondents stated that they encouraged students to question fundamental methods and standards for rightness or wrongness when applied in EIAs. Examples of the comments included the following:

*For their project, I give the students a template to compare EIA against. Was the EIA done well? Did they get the data from a secondary source and apply it to their own project? Why did they use secondary data, and what are the problems with it? Is it transferable to the project?* Respondent No. 9

*The goals of environmental planning are effectiveness, efficiency and equity, and I bring it back to these three issues. And the legislation how well does it fulfill the ideal. Each component results in different decisions that affect the effectiveness, efficiency, and fairness of what EIA ideally should be.* Respondent No. 16

#### **iv. Bridging Disciplinary Boundaries in EIA Education**

EIA is described as an interdisciplinary process that involves the collaboration of a multidisciplinary team. As one respondent stated,

*Those doing EIA's are doing it from different backgrounds and they don't necessarily go to the same conferences. Those teaching EIA are from geography, biology, and other backgrounds. Respondent No. 8*

Larger EIA projects like mining and hydroelectric development affect communities that are steeped in traditional values and culture. Furthermore, traditional cultures possess an awareness of patterns in the natural environments that do not follow the rules of objective western science. To better understand how respondents relate the various disciplinary perspectives to the value laden real world of EIA issues, they were asked two questions relating to how they bridged disciplinary boundaries in the classroom.

The first question asked, "In your EIA course(s), do you look at perspectives other than Western Science? For example, do you cover other ways of knowing such as traditional ecological knowledge (TEK)?" Nineteen of the 21 respondents stated that they introduced TEK into their course(s). Of the two respondents who did not address TEK, the first indicated that TEK would be added to the course in the future, and the second stated that the course was taught from a different perspective where issues such as TEK were not part of the course design.

There were varying ways in which TEK was brought into classroom discussions. For many respondents, TEK was briefly introduced when considering biophysical and social impact assessment, case studies, and public participation. In other EIA classes, students were required to include TEK in role-play projects or include TEK related issues in their term assignments. One respondent who said the following summed up the importance of TEK:

*I tried to look at TEK initially and found it frustrating until I brought a guest speaker into the class to talk about it. Now I see the great value in TEK.*

Respondent No 4

Keeping in mind that values play a key role in the EIA process, other “perspectives” that respondents introduced into class discussions included: alternatives analysis, archaeology, cultural values, common sense, decision-making, local and community knowledge, public opinion, religion, social and community values, and women’s issues.

The second question asked, “how do you move outside the disciplinary boundaries to the broader worldview”. The respondents acknowledged this question was challenging and as a result elicited a variety of responses.

Eight respondents spoke about how they related classroom discussion to real world application of EIA by critically evaluating and questioning case studies, bringing guest speakers into the classroom, and encouraging role-playing. For example,

*I emphasize the marriage of theory and practice. I have guest speakers from the private sector to discuss the reality of doing EIA. The students are facing people without a perfect baseline, and it forces them to grapple with what data to use and what they can do with it.* Respondent No. 10

Five respondents drew attention to the broad mix of disciplinary skills that are critical to EIA. They described how they conveyed the importance of those skills by relating EIA to broader planning issues and sustainable development as follows:

*The scope of the program is in the context of interdisciplinary right off the bat. Students come from various backgrounds with varying levels of skills, and*

*I focus on how to use them in EIA. I use examples from social sciences, engineering, natural sciences, and hydrology, and I ask students how they would apply them. They are not going to do the entire EIA by manage a project or a specific component where they will use their knowledge.*

Respondent No. 16

*At the gradate level, the course moves out of the box into the larger planning area and into the context of sustainability. EIA has not typically been concerned with sustainability.*

Respondent No. 20

Nine respondents emphasised that EIA was interdisciplinary by definition.

Some respondents strongly emphasized that EIA itself did not fall within any disciplinary boundaries:

*I don't see EIA as disciplinary but as a process of different sets of activities. I say that it is anti-disciplinary and I respect disciplinary issues only when forced to.*

Respondent No. 11

*It (EIA) is not disciplinary and it is not a discipline in itself because it is all over the place.*

Respondent No 13

Finally, several respondents rationalized that their personal perspectives reflected on how they taught EIA. They ascribed to a personal perspective not restricted by disciplinary boundaries as supported by the following comments:

*I am not a strictly disciplinary person. I focus on the practical aspects of how policy is being interpreted and implemented in the context of bureaucratic obstacles and limited staff and uses.*

Respondent No. 17

*I totally don't believe in disciplinary boundaries.*

Respondent No. 15

This section looked at teaching and learning about EIA in the classroom. Respondents taught EIA courses from an interdisciplinary perspective, and they encouraged students to think critically about EIA issues. Class instruction was active and interactive. The respondents used a variety of teaching/learning methods that



included Socratic teaching, student led discussions, role-playing, and group collaboration. Furthermore, students were provided with the background and principles of what EIA was meant to accomplish. Then, through the extensive use of case studies, students re-examined the cases in terms of the normative criteria they has learned, and moreover, they were encouraged to question the basis of fundamental methods used in EIAs.

#### **4.4 Training Material**

The respondents were asked if the training materials for the classroom included a textbook and/or selected readings. Twenty of the 21 respondents provided students with reading lists or readings packages that could be purchased from university bookstores. The one respondent who did not provide reading lists required students to develop their own bibliographies in EIA from a suggested list of journals.

While one respondent asserted, "No single textbook is adequate for training material," another stated, "Respondents are designing their own training manuals." To others, it did not make a difference whether a textbook or training manual were made available to students because as one respondent (No. 8) stated, "I've found that the students don't buy the texts and don't buy the readings packages either." Only eight of the respondents in this study recommended that students purchase one or more textbooks; however, several respondents agreed that the Sadar publication is a good reference guide. The textbooks identified for use in the classroom included the following:

- Sadar, M. Hussain. 1996. Environmental Impact Assessment. Second Edition. Carleton University Press, Ottawa. (Required by 3 respondents.)
- Wood, Christopher. 1996. Environmental Impact Assessment: A comparative review. Longman, Essex. (Required by 3 respondents.)
- Smith, L. G. 1993. Impact Assessment and Sustainable Resource Management. London, Longman. (Required by 2 respondents.)
- Barrow, C. J. 1997. Environmental and Social Impact Assessment: An introduction. Arnold, New York. (Required by 1 respondent.)
- Morris, P. & Therivel, R, (eds). 1995. Methods of Environmental Impact Assessment. UBC Press, Vancouver. (Required by 1 respondent.)
- Postrel, V. 1998. The Future and its Enemies: The growing conflict over creativity, enterprise, and progress. New York: The Free Press. (Required by 1 respondent.)
- Huber, P. 1999. Hard Green: Saving the environment from the environmentalists. New York: Basic Books. (Required by 1 respondent.)

Journals were a key source for the selected readings in EIA courses, and respondents identified the journals that they found the most useful for teaching purposes. The top seven journals identified by 18 of the 21 respondents interviewed are listed in **Table 10**. The journals are listed in the order of the frequency that they were identified. Other journals that were identified only once include: Alternatives,

Risk Analysis, Society and Natural Resources, Environmental Development and Sustainability, Ecosystems, Natural Resources Forum, Environment and Planning A, Urban Studies, and Science.

**Table 10.** The top seven journals used for teaching purposes based on the responses from 18 of the 21 respondents surveyed.

Journals	Number of Respondents
1. Environmental Impact Assessment Review	15
2. Impact Assessment and Project Appraisal	8
3. Journal of Environmental Management	6
4. Journal of Impact Assessment	4
5. Journal of Environmental Planning and Management	3
6. Journal of Environmental Law and Practice	2
7. Journal of Environmental and Policy Management	2

Several respondents provided copies of their reading lists. Other reading lists were accessed through the Internet. One frequently listed Canadian journal article worth mentioning is the following:

- Beanland, G. and Duinker, P. 1983. An Ecological Framework of Environmental Impact Assessment in Canada. Federal Environmental Review Office, Hull, Quebec.

While respondents' research activities are discussed later in this chapter, it is important to point out that *Environmental Impact Assessment Review* was used in the classroom for its Canadian content. Other journals noted for publishing Canadian research papers included *Journal of Environmental Planning and Management* and *Impact Assessment and Project Appraisal*.

Insofar as respondents opted for reading lists, many of the respondents interviewed agreed with the following statement:

*There is a need for EIA education and literature to back up with the planning literature and theory literature of public policy and planning; it is too isolated from scholarly and theory traditions. We need a good collection of case studies for teaching. They are too hard to get and the ones that are there are useless for teaching purposes. It needs someone to pull them together for the classroom. The textbooks out there are not very good and are based on UK or Australian issues.* Respondent No. 17

Most of the respondents regarded “good” Canadian case studies (federal and provincial) crucial for teaching purposes. A few respondents considered the case studies listed on the Federal and provincial websites satisfactory for class instruction, but others were looking for an independent assessment to identify those best suited for classroom use. One respondent was inundated with case studies, but they were highly unsuitable for teaching.

*I get sent tons of case studies. There is some difficulty in getting information in methodological areas and to finding what new concepts and approaches are out there. They are all over the map. Much is hidden and not easily accessible and more challenging to find.* Respondent No. 10

Clark (1999) strongly favoured the Internet as a means of strengthening the EIA network. While one respondent asserted that, “Professors are not the greatest networkers,” other expressed interest in sharing teaching resources through well-designed websites. The results from this study clearly suggest that good websites would be valuable tools for sharing the best resources. Over one half of the respondents agreed with the following comments:

*There needs to be a way to share and online would be the best. I am all for a single-window clearinghouse that collects, organizes, and disseminates useful materials.* Respondent No. 8

*"The practitioners need a website or centre to get information. Education practitioners need a centre or website for videos and access to information.* Respondent No. 6

In summary, most respondents used a variety of case studies and journal articles with Canadian content for teaching and learning about EIA. Although there are textbooks about EIA, some respondents were looking for more, comprehensive textbooks for teaching EIA. Finally, respondents extolled the benefits of a good website or a single-window clearinghouse for shared access to teaching and training materials.

#### **4.5 Student Interest in EIA**

Respondents were asked if their courses were open to students from other disciplines, and if they actively recruited students from outside the programs offering EIA course(s). They were also asked to identify the disciplinary backgrounds of students who take EIA courses. Firstly, **Table 11** demonstrates that most undergraduate level EIA courses were open to students from other programs or other disciplines. Prerequisites restricted access to 3 courses. The Environmental Science programs offering 2 of these courses required that students have a science background, and the third course was a senior level or 4th year course where students required a 4th year standing in Environmental Studies, Environmental Science or Geography.

The graduate level EIA courses were open to students from other programs, but participation was at the discretion of the respective faculty advisors. One graduate EIA course is offered in the EIA Diploma Program at Concordia University, and access is contingent upon acceptance into the program by the Faculty of Graduate Studies.

**Table 11:** EIA courses open to other disciplines in other faculties.

Level	Total Courses	Open	Restricted
Undergraduate	19	16	3 <sup>1</sup>
Graduate	5	5 <sup>2</sup>	—
Total	24	21	3

<sup>1</sup> Two courses had a science prerequisite requirement and one course was a senior level course with a prerequisite 4th year standing in Environmental Science, Environmental Studies or Geography.

<sup>2</sup> The graduate level courses were open to other disciplines but participation required having permission from the faculty advisor.

The University of Waterloo offers a series of 3 courses specializing in EIA. These were open to students following degree studies whereas students seeking a certificate in EIA were required to follow a tailored program of studies defined by the program.

Secondly, students are not actively or purposefully recruited into individual EIA courses but into the broader general program of which EIA is one of many courses. The exception was the newly developed graduate EIA Program at Concordia University where there was an extensive advertising campaign promoting the new program to all Canadian universities. As far as the private sector or individuals

seeking professional development in EIA was concerned, a respondent stated, “The course is open to the private sector and those people come to us. We do not recruit them.”

Thirdly, respondents identified, to the best of their recollection, the disciplinary backgrounds of students who have participated in their courses. **Table 12** lists the disciplines with the bracketed numbers representing the number of respondents identifying students in each category. The backgrounds of ‘sciences’, ‘biology’, and ‘chemistry’ were grouped under the heading ‘natural sciences’.

**Table 12:** The disciplinary backgrounds of students taking EIA courses. The bracketed number refers to the number of respondents identifying students in the category.

Disciplines	
• Environmental Studies/Science (8)	• Arts (3)
• Geography (9)	• History (2)
• Natural Sciences (9) <sup>1</sup>	• Language (1)
• Engineering (7)	• Business Administration (1)
• Planning (4)	• Psychology (3)
• Economics (4)	• Canadian Studies (1)
• Political Science (3)	• Philosophy (1)
• Sociology (3)	• Geology (1)
• Professionals (2) <sup>2</sup>	• Mathematics (1)
• Public Health (1)	• Marine Science (2)

<sup>1</sup> Natural sciences include biology, chemistry

<sup>2</sup> Professional were non-students individuals from the private sector and individuals from EIA agencies like CEAA. Respondents did not indicate if these individuals were auditing the class or actively enrolled at the university.

EIA courses appeared to draw students from a diversity of backgrounds. As it was discussed earlier in this chapter, Environmental Studies/Science, Geography, Urban and Rural Planning and Engineering are the key programs offering EIA courses; therefore, it would be common to find students from these programs in EIA

courses. There were fewer students identified with political science, economics, and public health programs. In fact, two respondents pointed out the apparent absence of political science students taking their EIA courses. EIA is as well a legal and administrative process where decision-makers require awareness training in EIA (Lee, Wood, & Gazidellis, 1985; Clark, 1999).

Students from various backgrounds enriched class discussions. A respondent enthusiastically commented, "you get an interesting perspective from the history students and other students in class discussions." Additionally, respondents identified professionals seeking instruction in EIA and individuals from EIA agencies (e.g. CEAA) in the category of disciplinary backgrounds. Respondent welcomed the hands-on experience with EIA that these people brought into the classroom.

#### **4.6 Professors: Research, Practical Experience and Support**

Both theory building for EIA and EIA research should take place at Canadian universities (Fenton & McQueen, 1996; Lawrence, 1994; 1997b). Equally important to EIA education is the contribution of practical experience by those who also teach EIA. Respondents expressed contrasting views on how professors were approaching the practical side of EIA:

*EIA is a practical and professional process and professional practice is important because of professional practice experience versus the academic ivory tower. Academics in Canada teach as if they know about professional practice, but they need to know about what hits the ground. There are good papers out there and they make good arguments for EIA practice but the conclusions are wrong when you try to translate them into good practice.*  
Respondent No. 4



*What is important those who teach it (EIA) should do it; the practical experience of the instructor is important because EIA is not just an academic exercise. Consultants and EIA experts from agencies coming in to teach it is not necessarily a good idea.* Respondent No. 20

To gain insight into EIA research activities at Canadian universities, respondents were asked if they engaged in EIA research, and if their research contributed to the training material used in their classrooms. Fifteen of the twenty-one academics interviewed not only engaged in EIA research but they also brought their research into the classroom. Two of the six respondents not involved in EIA research were involved in research in other natural resource or environmental areas, and they introduced aspects of their research into the classroom. Two respondents stated that they were not actively engaged in any research activities, and two respondents' research interests were in non-EIA related areas.

Respondents identified their most recent EIA research areas, and their research topics were grouped into eight theme areas. The areas of research included education in EIA (specifically transformative learning as it related to public participation), public participation, strategic environmental assessment, and cumulative effects. Research on "EIA methods" related specifically to scoping, and activities grouped under "specific impacts" included First Nations and mining, sustainable mining, hydroelectric power development, nuclear fuel waste. Research on "sustainability" referred to research on defining indicators for sustainability, and "social and economic impacts" related to community involvement in landfill siting and the social impacts of sustainable mining in First Nations' communities.

Again, EIA education is further supported by the knowledge and experience that respondents bring to the classroom. Respondents were asked to identify how they obtained most of their practical EIA information. In this study of twenty-one EIA respondents, 10 respondents engage in private consulting, 4 respondents stated that they were involved in case work, and 2 individuals have sat on EIA panels.

Other opportunities that added to the body of respondents' practical experiences included belonging to professional associations and attending conferences. Access to cases studies, the literature, and the Internet were also identified as sources of practical information for respondents.

Nine of the 21 respondents revealed that they delivered EIA courses to non-student audiences. Notably, seven of those respondents fell into the group of respondents who were identified as teaching EIA courses for more than 10 years. The non-student groups of people identified included environmental groups, citizen groups, non-government organizations, EIA professionals, health care professionals, people in the private sector (industry), and people working for government agencies.

Keeping in mind that EIA agencies offer informal EIA training, respondents were asked if they or their students had ever taken part in training courses offered by the Canadian Environmental Assessment Agency or any other EIA agency. Six respondents had taken cumulative effects training offered by CEAA plus two of those respondents had also delivered cumulative effects training for CEAA. Interestingly, two respondents stated that they had not taken part in CEAA training because they were not aware that such training existed.

Generally, respondents indicated that their students had not taken informal CEAA training. The exceptions were one respondent who indicated that he “raised the money himself for the students to attend cumulative effects training”, and two others who were aware that students had taken CEAA training either in the past or after graduation.

How were respondents supported in their roles as EIA educators? Those who were newer to teaching EIA were looking for opportunities to network with other course instructors. Furthermore, they were looking for opportunities to share resources either through a formal network or through sharing online teaching materials. One respondent favoured more cooperation among academics by stating,

*There should be more cooperation among academics. Informally there is some degree of association through those academics that belong to the Canadian Association of Geographers and the sub section that is related to EIA. There is more potential for cooperation among respondents regarding EIA teaching. There are various texts produced by academics and there is a potential for more.* Respondent No. 20

Others saw obstacles to working together as follows:

*Those doing EIAs are doing it from different backgrounds and they don't necessarily go to the same conferences. Those teaching EIA are from geography, biology, and other backgrounds.* Respondent No. 8

Respondents saw a potential for cooperation or exchange of teaching/training materials among universities and between universities and EIA agencies.

Respondents saw not only a need to share teaching materials but to also share ideas for curriculum development.

*There is a need for local examples. I have been teaching for 2 years and put the course together without the benefit of notes that were passed on. Need to share how to put the course together.* Respondent No. 18

Newer EIA instructors were looking for guidance in developing EIA courses. Respondents had been asked if they could identify any journals or publications that described what EIA education should embody. The answer was "No" other than for the following:

*One reading from Petts.*" (The reference was to an article titled "Capacity Building" written by Brian Clark and published in an edited volume by Judith Petts.) Respondent No. 1

*From time to time, I come across articles from conference proceeding and the UNEP.* Respondent No. 2

Respondents were divided over the potential for cooperation or exchange of teaching/training material between universities and industry or the private sector. Those who were sceptical about the exchange of material between universities and the private sector agreed with the following comments:

*Yes, case studies but the private sector is not open to universities.*  
Respondent No. 6

The respondents who saw opportunities for the exchange of educational materials between industry and the private sector were looking for sharing case studies and online resources. Respondents shared the view of one respondent, who stated,

*There needs to be more widespread access. The practitioners need a website or centre to get information. The Agency website needs to be improved. Education*

*practitioners need a centre or site for videos and access to information.*  
Respondent No. 6

Eighty percent of the respondents included their own research in the class training materials, and over two thirds lent their practical experiences with EIAs to classroom discussions. Respondents' experiences and research benefit EIA education in two ways. First, respondents are contributing to the body of Canadian content in EIA that appears to be absent in other forms of training materials. It would be tragic to lose this benefit, which could occur if sessional instructors are hired to teach EIA courses. Second, practical experience moves educators outside the academic circle and into the professional EIA world, which is essential to overcome the problems that are described in Chapter 5.

#### **4.7 Summary**

The results of this study are summarized into three categories, diversity of courses, content and delivery. In terms of delivery, the results established that the number of Canadian universities teaching EIA courses has more than tripled since the mid 1980s. There are a diffuse number of single elective EIA courses offered by university programs across the country. It was also shown that more than one program in each university offers some version of EIA training. For example, each of Geography, Environmental Studies/Science and Engineering programs within a single university may offer a version of EIA education. The generic course description derived from university course calendars aptly described these courses. Moreover, EIA is included in some Natural Resource Management courses as one of many tools discussed throughout the course.

The EIA courses were not necessarily linked to other related courses to add depth to the study of EIA. Furthermore, there was an under representation of courses that address Biophysical Impact Assessment and Social Impact Assessment. Finally, the glaring absence of courses that specialized in key EIA theme areas such as Cumulative Impact Assessment and Traditional Ecological Knowledge and EIA was apparent from both the calendar survey and interviews.

In terms of content, closer examination of EIA courses demonstrated that courses cover the broad range of issues related to EIA. Hence, EIA is offered as a survey course in most cases. After all, it was possible to derive a generic course outline from both graduate and undergraduate level EIA course outlines. The thesis advisor to this study clarified that survey courses introduce students to the broad range of issues in a particular area of study, in this case EIA. They are not intended to be in depth studies.

The results of this study also demonstrated that the respondents, teaching graduate and undergraduate level courses, used the innovative teaching/learning methods suggested in the literature. In active and interactive classroom settings, respondents inspired students to learn more about EIA through role playing, group collaboration and student led discussion. Case studies played an important role in teaching students to think critically about EIA issues by relating them to the real-world application of EIA. Students were encouraged to look for shortfalls and omissions in real cases and they were persuaded to rigorously challenge principles, methods and measurements using a variety of knowledge bases. As well, students

were encouraged to question the purpose, methods and practices of EIA in relation to the goals of sustainable development.

Training materials was a leading issue in this study. Two-thirds of the respondents agreed that there was a need for good textbooks for teaching EIA (specifically in a Canadian context). To compensate, respondents selected readings from journals. Environmental Impact Assessment Review, Impact Assessment and Project Appraisal, and the Journal of Environmental Management were the favoured journals for the classroom. Furthermore, these journals offered a selection of Canadian EIA research papers. Beyond that, respondents' research activities and practical experiences with EIA added a Canadian content element to classroom studies.

In terms of delivery, the University of Waterloo, Concordia University, and Lakehead University offer programs that specialize in EIA at the undergraduate level, graduate diploma level, and certificate level respectively. Using the University of Waterloo as an example, students entering the Faculty of Environmental Studies enrol in courses that provide the foundation for EIA studies. The specific EIA courses are progressive, a broad introduction to EIA topic, a focused practical application of EIA, and an in depth study of EIA as it relates to environmental management and planning. The University of Waterloo offers specialization in EIA at the undergraduate level, and it offers a joint certificate program with Niagara Community College. With joint programs, students are exposed to both the theoretical and applied sides of EIA education and training.

Concordia University offers a newly developed graduate diploma program in Environmental Impact Assessment. The Concordia program was developed through coordinated effort within the university to establish a new program, and courses that are linked with EIA were pulled together from various disciplines within the university. Unique to this program is the opportunity for internship.

Other universities have instituted programs where students specialize in professional environmental planning or environmental management programs within theme areas. Examples of theme areas include environmental planning and design, watershed management, applied environmental science, marine management, ecological restoration, and natural resources sectors such as forestry. In these programs, EIA is generally offered as a single elective course.

Respondents had more to say about EIA and EIA education. Their comments and the results of this chapter are discussed in Chapter 5.



## CHAPTER 5: TAKING STOCK OF HIGHER EIA EDUCATION IN CANADA

### 5.1 Overview

Lee, Wood and Gazidellis (1985), Sadler (1996) and Clark (1999) described how EIA education and training should bring members of the EIA community together in a common goal: effective, efficient, and fair EIAs. The respondents who participated in this study have an extensive history with EIA (fifty percent teaching EIA for ten years and greater). It was therefore important to get a sense of the respondents' overall views on the effectiveness of EIA education.

The respondents were asked to comment on EIA education in relation to opportunities for cooperation between universities and the private sector and universities and the public sector. They were also given the opportunity to openly express their views on the status of EIA education. The intention of this chapter is to discuss the findings and in doing so, link Chapter 4 issues with issues raised in Chapter 5.

### 5.2 Disillusionment

Several respondents were disillusioned by the progress of EIA in Canada. For example, one respondent wished to pull out of teaching and participating in EIAs because of "flaws in the entire process." The respondent explained that

*All the time and money spent in the public consultation process and EIA process is wasted when the decision can be overturned on a whim of cabinet.*  
Respondent No. 21

As well, one third of the respondents agreed with the following statement:

*EIA has become institutionalized without meeting the profound change in what environmental assessment was envisioned to do or what it was intended to do: give sober thought to large-scale projects before there are irrevocable environmental and resource losses. It does not live up to that promise. EIA is easily interfered with politically and there is a subversion of EIA ideals when it suits governments to do so. Respondent No. 14*

EIAs include values-based information, and they are further complicated by inconsistent policies and guidelines that cut across administrative jurisdictions (Beattie, 1994; Gibson, 1993). The outcome of the EIA process is a decision on how to proceed with a development project, and that decision depends on the rigorousness of the guidelines used. Federal EIAs are a Canada-wide process that often overlaps with provincial and territorial EIA legislative processes all of which are guided by different sets of rules. Furthermore, Dwivedi, Kyba, Stoett, and Tiessen (2001) emphasized how the EIA process is subject to the discretionary powers of elected officials who control the flow of information. Decisions are often based on the economic benefits major development projects, and to that end, the potential environmental impacts of those projects are often minimized (Dwivedi, Kyba, Stoett, & Tiessen, 2001).

Clark (1999) indicated that strong formal and informal networks and linkages among the public sectors, private sectors and educational institutions were vital to the effectiveness and efficiency in EIA. However, Doyle and Sadler (1996) and the respondents interviewed in this study were disappointed with the progress of networking in Canada. The issue is deeper than strong networks. As discussed in Chapter 2, the delegation of power and authority between the federal, provincial, and

territorial governments determines the operation of educational, administrative and regulatory agencies. These institutions are all guided by different sets of principles as to what constitutes environmental protection and sustainable development (Dwivedi, Kyba, Stoett, & Tiessen, 2001). Sorely lacking is what Nattrass and Altomare (1999) referred to as a profound change in behaviour in all organizations with respect to sustainable and unsustainable practices.

### 5.3 Sharing

For a few respondents, the disillusionment with EIA appeared to be bolstered by constraints to sharing. Some respondents were dismayed by the lack of solidarity among the public and private sectors and universities in the Canadian EIA community. Furthermore, they were greatly concerned about the shortfall in EIA training in those people already involved with EIAs. A diverse group of people with varied interests participate in EIA at several levels throughout the process, and as one respondent stressed,

*There are so many people out there doing EIA with varying degrees of knowledge. There is a gap between EIA agencies, the private sector and universities. Agencies do their own training and it is not necessarily critical or practical in the case of their people and programs. They do not bridge the applied and practical gap. Agencies need to identify the needs so universities can respond to the changes. They need to identify the gaps. Agencies develop their own programs and their people do not go to universities to get trained.*  
Respondent No. 2

Those respondents who felt that the private sector resisted cooperating with universities expressed these serious concerns:

*People get it (EIA) by osmosis. There is a loose structure of consultants and services, and beyond that, there are CEAA workshops. Industry sees EA as an annoyance rather than a tool to discharge their obligations.*

Respondent No.10

*The institutional arrangements that govern the private sector have different views of what education ought to be.* Respondent No. 14

Respondents viewed the lack of cooperation among the various actors at all levels in the EIA process as “bureaucratic obstacles.” Lee, Wood and Gazidellis (1985) and Clark (1999) described those who benefit from EIA training to include public administration and policy people, business people, people in media services, and the public.

The results of this study suggested that EIA was not promoted outside of the programs offering EIA courses. While this study demonstrated that a diversity of students took EIA courses, some key areas were underrepresented. A respondent commented on the surprising lack of political science students taking EIA; after all, these students could become future decision-makers. As well, students from business administration, economics and sociology programs benefit from EIA training in the event they participate as multidisciplinary EIA team members. This can be done through creative networking. Workshops, seminars and conferences provide tremendous education and training opportunities.

#### **5.4 Lack of Excitement**

Three respondents felt that the complex political environment of EIA did little to generate “excitement” about EIA in Canada. Respondents indicated that because sharing was not occurring, EIA had lost its appeal. As one respondent explained,

*"There is an institutional constraint to sharing. To some, EIA is not exciting enough to develop it further"* Respondent No. 8.

Other comments were similar to the following:

*EIA has never reached its potential because the planning is misunderstood. The passionate environmentalist co-opt it one way; the developer co-ops it another way. You have cynicism on one hand and prevention on the other. Is it working? There is a lack of excitement.* Respondent No. 8

A "lack of excitement" in EIA is discouraging if it is occurring within universities. Sadly, new tools like Geographic Information Systems (GIS) are introduced, and they generate a renewed zeal. There tends to be an underlying hope that new tools will be a panacea to problem solving, but they must be linked to EIA applications to stimulate excitement.

An external factor came to light during the interview process that appeared to be dampening the enthusiasm of respondents from Ontario. Respondents alluded to changes in provincial policies that might affect EIA in Ontario. The problem stemmed from a slow down in development in Ontario.

*It is the Ontario government; nothing is going on; nothing is getting built. There is a downturn and a technological shift with less focus on big engineering projects and more activity towards operating in the environment. Because there is not a lot happening for consultants, the skill set for consultants is inclined to be scoping or work proposals. The process has become homogeneous: biophysical measurements versus the real world of municipal politics.*  
Respondent No. 15

There will always be change; however, other areas in EIA require long needed attention. Examples include cumulative effects, monitoring, and follow-up. Changes,

flaws and imperfection should increase the resolve of educators to broaden and strengthen education programs.

## 5.5 Optimism

The majority of respondents agreed that there were opportunities for universities to cooperate with other universities and the public and private sectors. These respondents were optimistic about how universities could strengthen links with the private sector.

*I think there is a lot that universities can give to the private sector particularly related to the awareness of procedures.* Respondent No. 21

*[T]here could be more cooperation with environmental consulting firms, the smaller ones not the bigger ones. They are the artists of the environmental consulting world.* Respondent No. 5

While respondents agreed that more cooperation would strengthen EIA practices, they also recognized that there was a lack of impetus to share. They saw the opportunity for the public and private sectors (preferably environmental consulting firms) to identify the gaps in EIA so that universities can respond to filling those gaps. Other areas of sharing included training material such as case studies, videos and research papers (all a source of Canadian content).

Respondents were in search of network building through the Internet. Respondents noted that there is no shortage of case studies, but they were looking for a single window clearinghouse where material could be collected, reviewed and disseminated. There was an overwhelming plea by the respondents for the opportunity to share resources via a good website.

## 5.6 Research

Fenton and McQueen (1996) emphasised the importance of university led research because it is conducted at arms length from the private sector. Spaling, Smit, and Kreutzwiser (1993) and Lawrence (1994 & 1997b) supported research as a means to dealing with knowledge gaps in EIA.

One respondent who favoured developing the professional practice of EIA as a means of tracking the effectiveness of EIA research in the field stated,

*There are lessons to be learned from professional practice. EIA should be developed as a professional field. There are good research papers out there and they make good arguments for EIA practice, but the conclusions are wrong when you try to translate them into good practice.* Respondent No. 4

Another respondent pointed out how universities were well suited to conducting innovative EIA research because they can take risks that private consultants cannot afford to take.

*Consultants play it safe. If there is a method that gets them through the process, they do it over and over again. They (consultants) don't take risks so there is no innovative work done out there. Universities will do that (take risks) and there is no risk to the university people; they can do something that is innovative and beneficial and it benefits the client. Universities are in a position to try creative ways where consultants find techniques that work and they continue to do them repeatedly. EIA is treated as reactive avoidance versus promoting sustainability.* Respondent No. 20

The results of this study demonstrated that scholarly research provided an important teaching aide in the classroom. Professors' practical experiences and research activities compensated for the lack of textbooks for teaching EIA in a Canadian context.

Based on the above comments, ongoing opportunities exist for continued research in developing best practices in EIA. The combination of practical experience and research lends itself well to bridging the theoretical and applied gaps in EIA. The majority of respondents are fulltime professors, many with greater than ten years of experience. Hence, these respondents should be able to use their expertise to affect changes in EIA education.

### 5.7 Specialization

Specialization or the lack thereof was the major issue flowing from the course calendar search and interviews. Issues surrounding specialization applied to both course content and program delivery.

Lee, Wood, and Gazidellis (1985) and Clark (1999) contended that undergraduate programs introduce students to EIA and provide an awareness of EIA methods and procedures. Specialization in EIA should occur at the graduate level where broad-based and interdisciplinary education adds depth to EIA related issues (Lee, Wood, & Gazidellis, 1985; Clark, 1999).

Over one-half of respondents agreed with the following statements:

*There are far too many disciplines offering their own version of EIA 101 (a survey course in EIA). We need to get some synergy happening to coordinate EIA offerings, and to get more specialty courses on specific EIA topics like cumulative effects assessment, social impact assessment, traditional ecological knowledge and EA etc.* Respondent No. 1

*EIA is treated as one subject area and it should be part of the larger picture and it should be integrated into the planning process. There are other courses such as risk assessment and technology assessment. There is not much integration across disciplines as a sub set of EIA. The courses should be linked*



*together so the students have the opportunity to take them; there should be a package for them.* Respondent No. 20

The results of this study demonstrated that there was a widespread offering of EIA courses across the forty Canadian Universities identified in this study.

Furthermore, a few respondents agreed that

*EIA is pragmatic and hard-core help with the decision making process, but it is just another tool, so we just expose students to EIA as a tool.*  
Respondent No. 19

The above statement emphasizes that EIA is offered as a “one-off” course that is not linked to other courses on EIA related topics. EIA is generally offered as a single elective course. Respondents noted the following:

*The scope and breadth of EIA cannot be covered in a single course. EIA is such a vast field. Universities are only introducing students to a small segment of it. So many areas require specialization. EIA is not introduced to students until the third or fourth year at the undergraduate level. As students progress through environmental studies programs, the numbers contract with respect to interest in EIA courses. Fewer go on to graduate programs to specialize in EIA.*  
Respondent No. 3

*We teach it (EIA) narrowly and it should be taught as planning and management. It should be expanded and broadened because the real action is at the management level. EIA is treated as one subject area and it should be part of the larger picture. It should be integrated into the planning process.*  
Respondent No. 5

It was possible to generate a generic course outline from undergraduate and graduate course outlines provided by eleven out of twenty respondents. The generic course outline demonstrated that 12 to 13-week classes covered the same themes, EIA from its inception to future issues in EIA. Although some graduate courses covered the same range of issues, one instructor noted that a few graduate EIA courses

advance to large area planning in the context of bridging the gap between EIA and sustainable development. Nevertheless, EIA courses are generally undergraduate level courses.

Survey courses provide a broad understanding of the wide range of issues related to the EIA decision-making process. New topics are squeezed into the courses as noted by one respondent who briefly included traditional ecological knowledge in class discussions on Biophysical Impact Assessment and Social Impact Assessment.

Survey courses lack depth. The respondent who indicated that there should be more synergy happening with EIA courses was looking for courses directed at in-depth studies of key theme areas such as cumulative effects assessment, social impact assessment, traditional ecological knowledge and risk assessment. These courses were absent or underrepresented in the result of this study.

The results also indicated that EIA courses offered by different programs at the same institutions were typically survey courses at both the undergraduate and graduate levels. For the most part, environmental programs are specializing in theme areas (watershed management, coastal zone management). The courses are concentrated on topics relating to the specific themes. Carleton, York and Toronto are examples of universities that have tailored their programs this way. These programs cover a range of issues related to environmental management, issues that may well be part of the decision-making process. EIA is included in the program as tools course or as an elective course but there is no evidence that the connections are made between EIA, risk and environmental management.

Respondents offered solutions to alleviate the congestion in EIA courses. Some recommended standardization in EIA education particularly in developing the science and the standards for assessing environmental effects. One respondent stated the following:

*There is a need for standardization where EIA goes deeper into environmental effects and where tests are repeatable. There should be more training in risk assessment. Procedures, methods, and practices in EIA need to be tightened because there is no method to evaluate identifying environmental effects, significance, residuals, and follow-up.* Respondent No. 2

As the comments suggest, there is a need to develop courses that specialize in key areas. Others opted for separating EIA education into two components,

*EIA should be in two components, background and field experience. Now it is rushed to cram it in as an introduction to important areas. EIA is still an emerging field.* Respondent No. 9

Again, the goal is to add depth to studies by splitting courses between the practical and applied aspects of EIA. One respondent admitted students had certain expectation of EIA education,

*The major problem is the tension between what students want: practical instruction versus a tendency for theory and policy.* Respondent No. 5

At Canadian universities, it is possible to specialize in EIA at the undergraduate level at the University of Waterloo and at the Graduate level (Diploma program) at Concordia University. At Waterloo, EIA courses are progressive. In the first and second years of study, students enrol in background courses that support EIA. The courses are arranged so that students build the knowledge base necessary for

understanding EIAs. There are three levels of EIA courses. The first provides an introduction to EIA issues, the second deals with the practical aspect of EIA, and the third course develops the linkages between EIA and environmental management.

The new graduate diploma program at Concordia University is an interdisciplinary program that supported the objectives of EIA. Courses relative to EIA were selected from a number of existing university programs, and a few new courses completed the program. The key feature of the program is the opportunity for students to internship in the public or private sectors.

## **5.8 Summary**

The results of the course calendar search and interviews described in Chapter 4 were discussed in relation to respondents comments on EIA generally and EIA education specifically. EIA continues to be an evolving field. Some respondents were disillusioned because EIA is not living up to its promises, and others found that EIA lacked excitement. Based on the results of this study, inconsistencies in education and training and weak EIA networks appeared to be the key contributing factors. However, the literature places blame on the absence of adopting sustainable behaviour that infuses all organizations and social institutions.

While some respondents were sceptical about sharing with the public and private sectors, most respondents saw opportunities to share resource even though they had doubts. There are tremendous opportunities to share case studies and other training material. There are also opportunities to share expertise through research.

Respondent described their perception of deficiencies in EIA education. Their views were supported by the results of the calendar search and interviews. EIA is generally offered as a survey course. Additionally, various program within universities offered similar version of survey courses in EIA.

Lacking were focused studies on key EIA topics. The alternative to survey courses would be a concentration of courses devoted to specific EIA topics. Respondents were looking for substantive courses in applied EIA methods. They were also looking for specialty courses in risk assessment, technology assessment, cumulative effects assessment, traditional ecological knowledge, strategic environmental assessment, and social impact assessment.

Packaging was important to recruit students into EIA. Respondents wanted courses to be clearly defined and linked for the student's benefit.

Chapter 6 goes on to report the conclusion from this study. The chapter will also recommend how EIA education can be revitalized.

## **CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 Overview**

The purpose of this study was to identify the opportunities for EIA education and training offered through undergraduate and graduate programs at Canadian universities to gain further insight into how course instruction was addressing EIA. This chapter summarizes the conclusions relative to the specific objectives identified in Chapter 1. Finally, this chapter makes recommendations on how EIA education may be modified and supported.

### **6.2 University Course Offerings**

This study identified that over 40 Canadian universities currently offer a wide range of EIA related courses. Environmental Studies/Science, Geography, and Natural Resource Management programs all offer EIA courses in the third or fourth year of undergraduate studies. While it was found that not all environmental programs offer EIA, other programs such as Urban and Regional Planning and Engineering do offer EIA suited to their specific needs. It was also discovered that the majority of EIA courses at both the graduate and undergraduate level are elective courses. This means that within environmental studies programs and other like programs students have the choice of whether or not to take EIA, it is not a core requirement.

This study identified three universities that offer some level of in-depth training in EIA. First, the University of Waterloo offers a concentration of courses dedicated

to EIA through the degree program offered by the Department of Environmental and Resource Studies, and through a joint certificate EIA program offered by the university and Niagara Community College. Second, Lakehead University offers a certificate program in EIA as part of continuing professional education. The third, Concordia University, is currently the only institution that offers a graduate level diploma in EIA.

This study established that the vast majority of both graduate and undergraduate level EIA courses are survey courses. Students are introduced to the broad range of complex issues that apply to EIA. As new issues arise, such as traditional ecological knowledge, they are introduced into classroom studies. Lacking, are courses that specialize in key EIA areas such as applied EIA, cumulative effect assessment, social impact assessment, risk assessment, traditional ecological knowledge, and strategic environmental assessment.

Notably, this study established the importance of Canadian case studies as a predominant teaching tool. However, for teaching in the classroom, professors wanted a process for selecting the best case studies out of the numerous ones that are available. Case studies are used to encourage students to look for shortcomings in the EIA process and to get students thinking critically about the real world application of EIA. This was revealed, however, that while there are good case studies there is a vital need for good textbooks for teaching EIA in a Canadian context.

### **6.3 Concerns over the Direction of EIA**

The majority of the professors and practitioners teaching EIA who responded to this study have an extensive history with EIA. They have been teaching EIA, conducting EIA related research and providing consulting services. Their comments and concerns suggest that EIA education and EIA in general are stalled. The majority of respondents are frustrated with EIA in general because, through experience, they found that the people who conduct EIAs are not necessarily trained in EIA, and poor development decisions continue to be made. The EIA process is intended to give sober thought to the potential for negative environmental impacts of development projects. However, projects tend to proceed regardless of the environmental consequences. There is no serious or profound change in development proposals. EIA is not being used therefore, as a tool for achieving sustainable development as many of the professors envisioned it might be.

As a result of this many EIA courses have a critical orientation, but professors teaching EIA lack initiative to develop new and more in-depth courses to make EIA a required course, in part, due to their frustration with how EIAs are being done. Therein lies a dilemma. Professors want better trained EIA practitioners but their own lack of enthusiasm about the EIA process means that they are not offering new and exciting courses that would provide the detailed education needed.

In 1996, Sadler called for a system of "best practices in EIA". Standard setting was not dealt with in this study, however it should be noted that efforts are underway by the Canadian Council for Human Resources in the Environmental Industry



(CCHREI) to develop national occupation standards in environmental employment. CCHREI is a partnership of universities, government and industry that establishes a certification process, and eventually, CCHREI would define the education and training needs for certification as an EIA professional if implemented. Such a move should not, however, undermine the role of universities in promoting social change where ethics, critical evaluation of social norms, and internalization of mindset are vital. Universities provide the forum to debate the language used, and language is important, especially in EIA. Innovative university EIA courses and programs must be available.

#### **6.4 The State of EIA Education and Training**

In their review of Canadian universities in the mid 1980s, Lee, Wood, and Gazidellis (1985) described Canadian EIA training needs as general awareness training, substantive training in assessment methods, specialized training on specific impacts, and EIA project management training. Furthermore, they contended that students should be introduced to EIA at the undergraduate level and they should specialize in EIA at the graduate level. Since the mid 1980s, those training needs still persist but new areas such as climate change and biodiversity demand more from EIA education and training courses and programs.

In 1998, Grady and Croal stated that there was a shortage of Canadian postgraduate programs in EIA and a need for professional development in EIA. The course calendar review of forty universities and interviews with twenty-one

professors lend further support to their concerns. The results of this study suggest that university EIA courses and programs are lacking in the following areas:

- EIA education is falling short due to an overabundance of survey courses (awareness training). These courses teach an awareness of broad EIA issues, but they lack depth.
- The preponderance of survey courses is causing a shortage of courses dedicated to topics such as cumulative effects, social impact assessment, traditional ecological knowledge, strategic environmental assessment, risk assessment, and technology assessment.
- There is a shortage of opportunities to specialize in applied EIA. Research oriented courses devoted to developing the science and standards of EIA are largely absent.
- There is a shortage of post-graduate courses devoted to training the EIA specialist. Concordia is the first university to offer a graduate diploma in EIA. Before that, EIA certificate training was only offered through undergraduate studies (Waterloo) or continuing education (Lakehead).
- There is a shortage of clearly defined pre-requisite courses related to the study of EIA. These courses would provide the knowledge base for EIA.
- Progress in EIA course and program development is not meeting the changing need to address such issues as climate change and biophysical assessment. This progress is beset by a dampened enthusiasm on the part

of those academics that have experience the frustration of working within the EIA process where, over the years, there has been little or no profound change in development proposals.

Since the mid 1980s, the number of universities offering EIA has tripled, which has led to the addition of a host of courses devoted to EIA. Unfortunately, the shortage in professional development in EIA through post-graduate programs persists.

This study demonstrates that formal EIA education at Canadian universities needs to be revitalized. Few universities provide students with complete programs dedicated to teaching EIA. As a result, the people who are hired to do EIAs may or may not have some awareness of EIA and EIA related issues. Universities must provide innovative courses and programs that are essential to meet the changing needs of environmental professionals who are required to deal with new and evolving ecological and socio-economic problems.

## **6.5 Recommendations**

This study proposed to recommend ways that formal education in EIA may be supported or modified. Universities have a key role to play in expanding and revitalizing EIA education in the following ways:

- Revitalize courses and develop clear programs. Universities, especially those with environmental programming need to develop EIA specific programs for students. Pre-requisite courses for EIA should be clearly defined. Furthermore, in designing such programs there should be

recognition of both theoretical and practical components of EIA. Capstone courses could be given in later years allowing students to draw on their educational background and to solve practical EIA case problems.

- Establish research-oriented courses that are dedicated to developing the science and standards of EIA. There should be more interaction between universities and the public and private sectors through community project work, student/instructor research projects, or apprenticeship in the private or public sectors.
- Develop courses that specialize in key areas of EIA such as cumulative effects, social impact assessment, strategic environmental assessment, and risk assessment. Governments, proponents and decision makers all must deal with issues like climate change where individuals require the skills that consider social and economic well-being in thoughtful ways.
- Link courses and to the broader concept of sustainable development. In a capstone course, students should be able solve problems by linking EIA with risk assessment, and environmental management systems.
- Improve resources for teaching EIA. There is an urgent need for textbooks and other resources for teaching EIA in a Canadian context. The body of academics that have a history with EIA could collaborate to develop such a textbook.

- Establish a Canadian EIA Network. New partnerships need to be forged between universities and the public sector to revitalize and improve the EIA process. The lines of communication need to be strengthened among these people to advance EIA to a new level, and the Canadian Environmental Assessment Agency should take a lead role in this area. Existing EIA networks could be expanded to promote EIA education. These include the Canadian Environmental Network, the International Association for Impact Assessment and the Canadian Association of Geographers.
- Promote EIA related courses to more people in the EIA community. EIA awareness training should be promoted to students in non-environmental related programs, e.g. political science, sociology, and business management. The benefits of EIA awareness training can be promoted through the university websites.

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## **APPENDICES**

## **Appendix A – Definition of Terms**

**Active Teaching and Learning:** is a highly participatory approach to teaching and learning that maximizes interaction between teachers and students, amongst students, and between the students and the subject material (Robson, 1999).

**The Agency:** refers to the Canadian Environmental Assessment Agency (CEAA). The Agency is an autonomous federal program that promotes and administers the federal environmental assessment process, policies, and practices.

**The Act:** *refers to the Canadian Environmental Assessment Act.*

**Capacity building:** *is defined in the United Nations Environment Program's (UNEP) EIA Training Resource Manual as "the long term, voluntary process of increasing the ability of a country to identify and solve its own problems and risks, and to maximize opportunities".*

**Critical thinking:** *refers to the ability to not only critically analyse conflicting knowledge claims, but to also have the ability to challenge and question existing paradigms (Jones and Merritt, 1999).*

**Education:** *refers to "the various ways in which a society transmits knowledge – including factual information and occupational skills as well as cultural norms and values – to its members". Formal education (a major social institutions in industrial societies) is conducted by "specially trained teachers". In Canada, higher levels of*

*education are offered at universities and community colleges. (Macionis, Clarke, and Gerber, 1994)*

**Environmental impact assessment (EIA):** Barry Sadler (1996) defined EIA as “a process of identifying, predicting, evaluating, and mitigating the biophysical, social, and other relevant effects of proposed projects and physical activities prior to major decisions and commitments being made.” There are variations on this definition cited in the literature to the extent that some authors distinguish between the terms environmental impact assessment (EIA) and environmental assessment (EA). For the purpose of this study, the term EIA is used because it refers to the more rigorous methods and practices of performing environmental impact assessments at the project level.

**Interdisciplinarity:** is “the capacity to integrate knowledge derived from disciplines with may have very different views as to what ‘counts’ as valid knowledge” (Jones and Merritt, 1999). Stefanovic (1996) further argued that interdisciplinarity reaches beyond borrowing concepts and tools from various disciplines to the structuring of a new level of discourse that connects concepts and applications across disciplines. According to Klein (1990), the interdisciplinary individual not only had “the general capacity to look at things from different perspectives but also the skills of differentiating, comparing, contrasting, relating, clarifying, reconciling and synthesizing. They need to know what information to ask for and how to acquire a working knowledge of the language, concepts, information, and analytical skills pertinent to a given problem, process, or phenomenon.”



**Multidisciplinary:** refers to a collaboration of several disciplines to solve a common problem. A multidisciplinary approach to problem solving is “additive versus integrative” because the process builds on the techniques, methods and theories from each contributing discipline. (Stefanovic, 1996)

**Sustainable development:** The term “sustainable development” reflects the Bruntland Commission’s broadly conceived notion that economic development must proceed with caution so as not to hinder the allocation of environmental resources between current and future generations (WCED, 1987).

**Training:** Feinberg (1983) described training as both instruction in the performance of rote procedures and the application of technical knowledge.

**University:** Universities are post-secondary education institutions with degree-granting powers at three levels of study: bachelor, master and doctoral. Education and research are the two principle mandates of university programs.

**Values Awareness:** refers to the ability to recognize and consider the significance of values, ethics, and environmental philosophy that enter into environmental debates (Jones and Merritt, 1999).

## Appendix B – Survey

### Questionnaire

#### I. The following questions deal with how students are recruited into EIA related courses.

1. (a) Are the EIA courses that you teach open to students from all disciplines in all faculties?      **YES**    **NO**

1. (b) If **YES** please indicate the disciplines that would represent the students interested in taking your EIA course(s) outside your own faculty.

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1. (c) Do you actively recruit student from other disciplines?      **YES**      **NO**

1. (d) If **YES** please explain how you promote EIA related courses to students in other disciplines/faculties.

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#### II. The questions in this section relate specifically to the courses on EIA that you teach.

2. Are you still in \_\_\_\_\_ (program)? Correction \_\_\_\_\_

Is that the faculty of \_\_\_\_\_? Correction: \_\_\_\_\_

3. How many years have you been teaching courses on EIA?

Number of Years	<input type="text"/>
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4. (a) Are you, or have you been actively involved in EIA research? Yes/NO. What is your most recent research activity?

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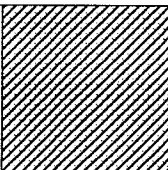
4. (b) Are there any paper or reports that I could look at?

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4. (c) The following relates to the specific courses on EIA that you teach. I will ask you to identify each course, and then I will ask you a series of question related to the course that you have identified.

1	Course Title		1.	2.
2.	Level of study	Undergraduate	<input type="checkbox"/>	<input type="checkbox"/>
		Graduate	<input type="checkbox"/>	<input type="checkbox"/>
3	Is this course a degree requirement		Yes No	Yes No
4	Is the course offered	Every year	<input type="checkbox"/>	<input type="checkbox"/>
		Alternative years	<input type="checkbox"/>	<input type="checkbox"/>
5.	How many years has this course been offered?			
6	Number of students per class			
7	Compared to previous years if this:	Up	<input type="checkbox"/>	<input type="checkbox"/>
		Down	<input type="checkbox"/>	<input type="checkbox"/>
		Steady	<input type="checkbox"/>	<input type="checkbox"/>
8	Is this course taught by:	Lecture	<input type="checkbox"/>	<input type="checkbox"/>
		Seminar	<input type="checkbox"/>	<input type="checkbox"/>
		Workshop	<input type="checkbox"/>	<input type="checkbox"/>
		Lab Based	<input type="checkbox"/>	<input type="checkbox"/>
		Fieldwork - if so what kind of fieldwork	<input type="checkbox"/>	<input type="checkbox"/>
9.	What are the main themes covered in the course?			
10	Are you using a textbook?	Y/N	Yes No	Yes No
		If Yes – What		
		If No – What		
11	Are students involved in the course design in any way?			

12	(a) Is the classroom active and interactive? (b) How so?			
13	(a) How do you get students to think critically about EIA issues?			
	(b) Do you bring your own research into class?			
14	Can you send me a course outline?		Yes No	Yes No

**III. EIA is described as an interdisciplinary approach to decision-making that strives to bridge the environment-science-society interface.**

5. In your EIA course(s), do you look at perspectives other than western science? For example, do you cover the role of traditional ecological knowledge in your course(s)?

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6. Do you move outside the disciplinary boundaries to the broader worldview? If so how?

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**IV. The following questions relate to things that support you and others in the role of EIA educators.**

7. Are there any journals that you find useful for teaching purposes?

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8. Have you come across any journals or publications that describe what EIA education should embody?

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9. Do you see any potential for cooperation or exchange of teaching/training material among universities and EIA agencies? If so, what?

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10. Do you see any potential for cooperation or exchange of teaching/training material among universities and industry or private sector? If so what?

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11. Have you ever delivered an EIA training course to non-student audiences?

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12. Have you or your class ever taken an EIA training course offered by the Canadian Environmental Assessment Agency (CEAA) or any other agency?

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13. Where do you get most of your practical EIA information?

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14. How might the CEAA, other government EA agencies or industry support EIA education?

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15. Do you have any comment on this survey or any additional comments on EIA education?

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## Appendix C – Introductory Statement

My name is Colleen Stelmack. I am a student at the Natural Resources Institute, University of Manitoba.

The purpose of my research is to identify the opportunities for EIA education and training offered through undergraduate and graduate programs at Canadian universities, and to gain further insight in how course instruction is addressing EIA and EIA related issues. The findings of this study will contribute to the development of recommendations of how EIA education might be modified or supported across Canada. The objectives of this study are to:

- a. Establish the need for and types of EIA education and training;
- b. Describe university course offerings;
- c. Identify the role that Canadian universities are playing in developing EIA education and training programs.

The interview will take approximately 35 minutes and will cover a range of topics related to your knowledge and experience in developing and instructing EIA courses. You are under no obligation to participate in the interview. If you choose to participate, please feel free to refuse to answer individual questions. In the event that you do not wish to answer specific questions, simply respond “no comment”. Your responses will be held in strict confidence, and the results of the study will be aggregated with no reference made to specific participants.

The University of Manitoba Joint Faculty Ethics Review Board has approved this proposal. If you have any questions or concerns related to this matter, please contact Ms Margaret Bowman of the Research Ethics Committee at (204) 474-7122, or Dr. John Sinclair, Thesis advisor, Natural Resources Institute at (204) 474-8374.

Before I begin, this study uses the *IAIA Principles of EIA Best Practices* definition for environmental impact assessment:

“The process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken or commitments made.”