

Survey of Impact Assessment Education

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Abstract

During the IAIA conferences held in 2008 and 2009, a survey questionnaire was distributed to academics involved in teaching any form of impact assessment (IA) in universities and colleges. Participants returned thirty-two questionnaires, representing 18 countries. Impact assessment is taught at both undergraduate and graduate levels. Formal lectures, case studies and group discussions are favorite teaching approaches, whereas site or field visits are used by less than 50% of the respondents. Practitioners are often invited guest lecturers. Environmental impact assessment (EIA) is the most frequent type of IA taught, with strategic environmental assessment (SEA) ranking second. Written examinations and reports are the most frequent means used to assess students' learning. There is a great similarity in course content, suggesting the existence of a core group of topics internationally relevant for IA education.

1. Introduction

Impact assessment (IA) and its specialized fields and tools are taught at tertiary education institutions in many countries. IA lecturers often attend the annual conferences of the International Association for Impact Assessment (IAIA) to present research findings, but seldom to discuss teaching approaches, methods, problems or course contents. Similarly, IA education is poorly documented in the literature (Stelmack et al., 2005). This is in contrast with a vast literature on disciplinary teaching in higher education, a research and practice field in itself. In the case of engineering education, as an example, there is with a well-established network featuring specialized journals and regular conferences.

Previous studies of IA education focused on environmental impact assessment (EIA) – often referred to as environmental assessment. Stelmack et al. (2005) surveyed 40 universities in Canada offering environmental assessment courses. Gazzola (2008) reviewed 64 master programs related to environmental assessment in nine European countries. Thompson (1992) provides one of the earliest examples of documenting academic teaching of environmental impact assessment by accounting an experience in Australia and Sánchez (2007) documents EIA teaching in one Brazilian university. So far, there is no published cross comparison of international IA education although it appears that IA teaching is expanding in several countries. This survey represents a first approach.

A questionnaire to survey IA teaching in different countries by members of IAIA was prepared. It intended to survey teaching methods and contents in order to test the possible existence of a common international curriculum for impact assessment. Different denominations and specialization fields of IA are used across countries and in the literature, such as environmental impact assessment (EIA), environmental assessment (EA), strategic environmental assessment (SEA), impact studies, social impact assessment, risk assessment and many others. Aiming at not limiting the survey to any particular meaning of IA or to any specialized field, the broad name “impact assessment” was preferred, as reflected in the name of the host association IAIA.

2. The survey

The idea of congregating IA educators to discuss teaching and education was mooted by one of the authors at the IAIA07 Conference in Seoul, Korea. In light of the enthusiastic reception this received from a number of educators, organizers planned a session about education at the IAIA08 conference. A questionnaire was jointly prepared by both authors by the end of that year and distributed to impact assessment educators at two annual IAIA Conferences, IAIA08 (Perth, Australia) and IAIA09 (Accra, Ghana) as well as at the 2008 Cumulative Effects Conference (Calgary, Canada). A session on IA teaching and education was organized

at the IAIA08 conference¹ at which the survey was launched; the results obtained pertain only to IA teaching by members of IAIA opportunistically surveyed at these conferences.

3. Results

3.1 Affiliations, denominations and history

The 32 respondents came from 18 countries (Australia, Brazil, Canada, China, Finland, Germany, Hong Kong, Ireland, Italy, The Netherlands, New Zealand, Nigeria, Portugal, South Africa, Ukraine, United Kingdom, United States and Zimbabwe). IA teaching was found to be situated in different schools or departments, underscoring the multi-disciplinary nature of practice (e.g. Morgan, 1998, p9). Survey respondents are faculty members of an array of disciplines, including environmental science, engineering, science and law. Grouping similar names of departments or schools, 28% of respondents teach IA at schools or departments of environmental science, environmental management or environmental design, 22% at engineering schools (including environmental engineering), 19% in science or social science and 19% in planning, geography or law.

Teaching impact assessment in Universities started soon after implementation of the US *National Environmental Policy Act* in 1970. The year first mentioned in regard to EIA teaching is 1972, at Stanford University in the US. However, as early as in 1973, EIA was also being taught in Canada, Italy and South Africa. Interestingly some of the pioneers who started teaching EIA in the 1970s are still active. Among the survey respondents, six out of 32 educators started teaching impact assessment before 1975, seven between 1976 and 1992, the year of the Earth Summit in Rio, when several countries passed or updated environmental protection laws and the remaining 15 respondents started teaching EIA after 1992.

Respondents teach IA at both undergraduate (81%) and graduate levels (97%) as well as professional training courses (34%). IA is mostly taught as a stand-alone subject and only in a few cases as partial content in a broader subject. These 32 respondents provided information on 70 courses (or units or modules, as different names are used across countries). While there is a predominance of courses labeled “environmental impact assessment” or featuring close variations to this, the varying nature of IA (e.g. as an applied science, a mixture of theory and practice, policy, legal studies) is apparent in the range of course titles on offer. In several universities, both introductory and advanced courses are offered by the same lecturer. Six universities offer an IA qualification or degree such as a postgraduate diploma on EIA or SEA; one university used to offer such a degree but discontinued it.

3.2 Teaching hours

For the 39 courses labeled EIA, EA, SEA or featuring a close denomination, total teaching hours are shown in Table 1. We have selected these as a focal point for data analysis because they provide the greatest opportunity for comparison between individual universities and educators. The remaining 31 are less easy to compare, especially then the IA content appears as just one or two hours of lecture material in a course otherwise devoted to some other science or policy discipline of study. There are two peaks, at 36 and 60 hours, but time spent ranges from 12 to 90 hours. This variation probably stems from different criteria used to account for teaching hours, some considering only time spent in classroom and others the total hours supposedly spent by students in connection with the course, including preparation of reports or other assignments. Most respondents, however, indicated that the number of IA teaching hours per week is usually from 2 to 5, which over a period of 12 weeks lead to totals from 24 to 60 hours; in some countries, the semester or teaching period is longer and that is why total hours is a better indicator for comparative purposes. An average of 44 hours is spent teaching the 39 courses.

Table 1 – Total teaching hours for EIA, EA or SEA courses

Total course hours	12	22	28	30	32	36	40	45	48	49	50	55	60	90
No. of respondents	1	1	1	3	2	9	4	1	3	2	2	1	8	1

Currently, IA is delivered mostly as classroom courses. When asked if any course is proposed on a distance learning format, only five affirmative answers were obtained. In all cases, these courses use a learning management system.

3.3 Teaching approaches and tools

After lectures - the classical teaching approach used by all respondents -, case studies are the most favored teaching tool, used by 85% of respondents, followed by group discussions, a technique used by 78% of respondents. Inviting practitioners or government officials as guest lecturers are used by 66% of

¹ <http://www.iaia.org/iaia08perth/cs/session.aspx?id=CS4.2&ts=13>

respondents, whereas role-playing is a technique adopted by 41% and field visits have been mentioned by 38% (Table 2). One university (East Anglia in the UK) has an “Environmental Assessment Fieldcourse”, whereas in the IUAV University of Venice, Italy, two EIA courses include 120 hours fieldwork in addition to regular 60-hour classroom activity. A learning management system is currently used by 31% of respondents and 62% have a dedicated website.

Table 2 – Teaching methods and tools

<i>teaching method</i>	<i>no. of respondents</i>	<i>%</i>
Lectures	32	100
Group discussions	25	78
Case studies	27	84
Role Playing	13	41
Site/field visits	12	38
Workshops	10	31
Invited lectures	21	66
Learning management system	10	31
Other	3	9

3.4 Student assessment

Several kinds of tools are used to assess students and almost all respondents use a variety of tools to assess learning (Table 3); only one respondent relies on a single assessment type. However, no assessment tool is universally used. Written reports, used by 91% of respondents, and written examinations, used by 84%, are the most popular. The least used tools are tests and quizzes, and oral examinations, although oral presentation of practical work is common (66%).

Table 3 – Students’ assessment tools

<i>Assessment tool</i>	<i>no. of respondents</i>	<i>%</i>
written output (reports, reading notes etc.)	29	91
written examinations	27	84
individual exercises	23	72
group exercises	22	69
oral presentation of practical work	21	66
classroom tests and quizzes	7	22
oral examinations	7	22
Internet tests and quizzes	1	3

3.5 Teaching resources

Less than half of the respondents (44%) use a textbook and those who do often adopt their own. Respondents cited fifteen textbooks on EIA published in five languages. However, even the educators who recommend a textbook also require students to utilize other sources, namely reading peer-reviewed papers and government documents such as guidelines, manuals or legislation. Only two respondents indicated that reading peer-reviewed papers is not required and only one did not mention the use of government documents.

3.6 Course contents

The survey presented a compiled list of content topics based on the authors’ own experience and on the contents of textbooks. Respondents were asked to indicate which topics are covered in their courses. Table 4 shows the number of responses against each topic. We did not consider in this part of the analysis those situations where IA content is taught only as part of an overall course. Thus, the total number of courses for which information was retrieved is 45, larger than the number of respondents; several educators teach two or three IA courses. The questionnaire also asked for information about approximate time spent for each topic, but this information was only provided by some respondents and sometimes only by group of topics (e.g. tools and techniques), making it difficult to draw any conclusion.

The main findings arising from this part of the survey are as follows.

- A few courses are sequential, thus one topic may appear in the first course but not be repeated in the second.
- Local or national legislation and EIA history are the content topics most mentioned under legal and institutional aspects. Interestingly though, US and European legislation are occasionally mentioned by lecturers teaching in other jurisdictions.

- The major components of the EIA process (i.e. from screening to follow-up) receive equivalent attention by individual teachers in a given course, but not all of the eight components identified in Table 6 are necessarily covered. Follow-up is the least frequent topic (58%) whereas public involvement is explored in 82% of courses.
- In terms of tools and techniques, the three traditional tasks of impact analysis (identification, prediction and evaluation) are present in a majority of courses whereas other tools are taught at a maximum of 53% of courses.
- EIA is the most frequent type of IA taught. SEA is the next most frequent. Most respondents teach SEA as a topic within a broader course on EIA. However, three respondents offer separate courses devoted specifically to SEA. Specialized forms of IA such as risk assessment and life-cycle assessment are under-represented in the survey. Considering that there is much academic and practitioner activity in these fields, as well as journals and professional associations, those who teach these subjects possibly do not attend IAIA conferences. In contrast with this, environmental management systems proved to be a popular topic perhaps underscoring links and synergies between IA and EMS as techniques for managing the impacts of development on the environment.
- in terms of scope of application, although respondents were asked to tick an item only if he or she delivered specific content on any one of the topics, a number of respondents stated that the content is scattered throughout the course and these answers were considered as one hit for each topic. Social and biophysical impacts receive equivalent attention whereas health and cultural impacts received less. Economic impacts are often mentioned in SEA or sustainability assessment courses, but are less frequently mentioned in EIA courses.

4. Discussion and conclusions

IA teaching is mainly “environmental”, either as EIA or as SEA within the IAIA educator community. Other forms of IA form a relatively minor part of teaching contents. There are many similarities in EIA/SEA courses evident around the world.

Several findings from our survey of IA teachers tally closely with the conclusions of Stelmack et al (2005) who undertook a survey of 40 Canadian environmental assessment courses. With respect to teaching methods, they also found that educators combine teacher-led lectures with other teaching methods. These authors identified four categories of instructional methods: Socratic teaching, role-playing, group collaboration and student led discussion. These methods are largely those used by the respondents to this survey. Stelmack et al (2005) found that case studies play a central role in most courses, and we found them to be used by 84% of respondents. In terms of teaching resources, they found that two-thirds of respondents agreed that there is a need for good textbooks within a Canadian context, whereas we found that 36% of educators adopt a textbook. Additionally, they found that published peer-reviewed papers are relied upon “to compensate” the absence of “good” textbooks, whereas we found that 94% of lecturers require their students to read published articles. Finally, they expressed a concern that most courses are “survey-oriented and introductory in nature, with little opportunity to specialize”, being compressed in a 12-week period (i.e. possibly ranging from 36 to 48 hours). On the other hand, we found that on average, an EIA course takes 44 hours, but many universities offer IA contents spread over two or three courses, while a few have an IA degree, which represents an opportunity to explore the field in depth.

Gazzola (2008) summarizes a study of EA related Master programmes in nine European countries. Relevant to our survey is the finding that the only “modules” (herein courses) common to the nine countries are “Theory of EIA” and “Environmental Management Systems”. Her paper, however does not discuss the contents of these fundamental courses, whereas Stelmack et al (2005) present a “generic EIA course outline” which is largely concordant with the contents featured in Table 6. In addition, Gazzola (2008) found that EA is rarely taught as a full postgraduate programme; out of nine countries, she identified EA as the principal subject in only four countries – France, Spain, Italy and UK. The first and second countries are not represented in our sample.

Differently from these papers, which looked at EA education within a country or region, our study aimed at surveying the international state of IA teaching. Hence, voluntary participation from academics was sought as a cost- and time-effective approach to data collection, while the other studies used intentional sampling. Possible bias in this survey arises from the fact that only educators who attended IAIA Conferences were contacted. Given that IA procedures are known to exist in more than 100 countries worldwide (the exact figure is not known) we would expect there to be other countries where IA teaching takes place that we have missed.

Overall, our study highlights the simultaneous diversity and similarity of IA teaching around the world. On the one hand, IA is truly an inter-disciplinary subject and this reflects the way it is positioned within university disciplines. However, there is great similarity in the manner of teaching delivery and in the specific topics

addressed (concepts and contents). The similarities in teaching approach suggest significant potential for lecturer exchanges as well as a possible role for IAIA to play in terms of fostering discussion about IA teaching and the curriculum that is taught. Perhaps this is fertile ground for IAIA members to explore further and to develop exchange networks between academic members accordingly.

Table 5 – Content topics of IA courses

Topic	no of responses	% of courses
Legal and institutional aspects		
local/national legislation	36	80
EIA history	34	76
European EIA/SEA Directives	23	51
international conventions (e.g. CBD, Espoo, Ramsar)	23	51
NEPA (US National Environmental Policy Act)	19	42
EIA process and its components		
screening methods or criteria	34	76
scoping methods and approaches	36	80
report preparation	33	73
public involvement	37	82
review of IA documents	29	64
decision-making	30	67
monitoring	31	69
follow-up	26	58
Tools and techniques		
impact identification tools	34	76
impact prediction tools	32	71
criteria to assess impact significance	35	78
multi-criteria analysis	24	53
modeling	15	33
geographical information systems	18	40
EIA issues		
alternatives generation or comparison	30	67
handling uncertainties	20	44
cumulative impacts	25	56
document quality/writing effective documents	26	58
mitigation and compensation	28	62
Types of impact assessment		
environmental impact assessment	41	91
strategic environmental assessment	33	73
sustainability assessment	15	33
risk analysis / risk assessment	13	29
life cycle analysis / assessment	9	20
environmental management systems	23	51
environmental performance evaluation	6	13
sustainability reporting / performance reporting	8	18
Scope of application		
social impacts	29	64
cultural impacts	17	38
economic impacts	20	44
health impacts	18	40
ecological impacts	29	64
physical impacts	24	53

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