

Professional practice

Teaching impact assessment: results of an international survey

Luis E Sánchez and Angus Morrison-Saunders

University teachers of impact assessment (IA) at both undergraduate and graduate levels were surveyed during IAIA conferences in 2008 and 2009. A total of 32 questionnaires were returned, with respondents teaching in 18 countries. IA teaching encompasses both theory and practice. It is supported by textbooks — a sign the IA is a consolidated field — but also by case studies, government or legal guidance and guest lectures. A vast majority of lecturers (94%) also use peer-reviewed papers, indicating that knowledge obtained from research is an important input to teaching. Formal lectures, case studies and group discussions are favorite teaching approaches, and field visits are used by 38% of respondents. Environmental impact assessment is the most frequent type of IA taught, with strategic environmental assessment ranking second. Despite IA teaching being positioned within different university disciplines, there is a great similarity in course contents, suggesting the existence of core topics internationally relevant for IA education and potential for viable teacher and student exchanges.

Keywords: education, teaching, environmental assessment, impact assessment, curriculum

IMIMPACT ASSESSMENT (IA) and its specialized fields and tools are taught at tertiary education institutions in many countries and represent one branch of ‘professional practice’ in the IA community. Impact assessment 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.

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 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. Thompson (1992) provides one of the earliest examples of documenting academic teaching of EIA by accounting an experience in Australia. Stelmack *et al.* (2005) surveyed 40 universities in Canada offering environmental assessment courses. A description of a masters program on EIA in the UK is provided by Barker and Jones (2007). Gazzola (2008) reviewed 64 master programs related to environmental assessment in nine European countries. Ramos *et al.* (2008) documented EIA training and higher education teaching in Portugal, and Sánchez (2010) similarly discusses 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 (Fischer *et al.*, 2007). This survey represents a first approach. In contrast to previous studies, which focused on EIA teaching in individual cases, in a country or in a group of countries with a number of common features in higher education (namely

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Europe and its initiatives towards harmonization of higher education known as the Bologna Process), this survey intended to test the possible existence of a core group of content topics in IA courses worldwide. Data collection was exclusively based on a questionnaire filled in by the lecturers themselves.

Different denominations and specialization fields of IA are used across countries and in the literature, such as 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.

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, it was agreed to hold a session about education at the IAIA08 conference. A questionnaire was prepared 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) and the IAIA South Africa (IAIASa) affiliate's Annual Conference 2009 (Wilderness, South Africa). A session on IA teaching and education was organized at the IAIA08 Conference,¹ at which the survey was launched. The findings were presented at the IAIA10 Conference (Geneva, Switzerland).

Table 1 shows the topics addressed in the questionnaire. Terminology proved to be a challenge as different countries and even individual universities within the same country use different terms to describe or classify teaching activity. A total of 32 questionnaires were returned, containing data on IA teaching in 18 countries, both developed and developing, spread

Table 1. IA teaching questionnaire contents

1. Name of university and school or faculty
2. Degree (name and discipline) in which IA is taught
3. Teaching levels (undergraduate, academic graduate, professional graduate)
4. Names of individual IA courses, modules or units
5. Number of teaching hours for each IA course
6. Teaching approaches and tools utilized
7. Distance learning availability and use of a dedicated website/learning management system
8. Methods for assessing student work
9. Teaching resources utilized (e.g. textbooks, peer-reviewed papers, government documents)
10. Specific topics taught within individual IA course contents

over five continents (Table 2). Although not representative of all of the countries from which IAIA members hail, the spread of survey respondents nevertheless indicates the international standing and widespread importance of IA teaching and learning within the university sector.

Results

This section features the main results obtained from the survey, along with a brief explanation. It is presented under a number of headings corresponding to the structure of the questionnaire.

Affiliations, denominations and history

IA teaching was found to be situated in different schools or departments, underscoring the oft-claimed multi-disciplinary nature of practice (e.g. Eccleston, 2000; Morgan, 1998: 9). Survey respondents are faculty members of an array of disciplines, including environmental science, engineering, science and law. Grouping similar names of departments or schools, 40% of respondents teach IA at schools or departments of environmental science, environmental management or environmental design, 25% at engineering schools (including environmental engineering), 19% in science or social science and 16% in planning, geography or law.

Teaching IA 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

Table 2. Number of respondents per country

Country	No. of respondents
Australia	2
Brazil	2
Canada	5
China	3
Finland	1
Germany	1
Hong Kong	1
Ireland	1
Italy	2
New Zealand	1
Nigeria	2
Portugal	1
South Africa	3
The Netherlands	1
UK	2
Ukraine	1
USA	3
Zimbabwe	1

in the USA. 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 IA before 1975, nine between 1976 and 1992, the year of the Earth Summit in Rio, when several countries passed or updated environmental protection laws, and 15 respondents started teaching EIA after 1992 (two respondents did not state the year they started teaching EIA).

Table 3. Titles of individual IA courses taught by respondents

Environmental impact assessment (14 entries)
Environmental assessment methods (2 entries)
Environmental assessment (2 entries)
Strategic environmental assessment (2 entries)
Environmental impact statements
Introduction to environmental impact assessment
Principles of environmental impact assessment
Environmental impact assessment I
Environmental impact assessment II
Advanced environmental impact assessment
Environmental impact assessment theory and practice
Techniques of environmental impact assessment
Environmental assessment fieldcourse
Introduction to environmental assessment
Introduction to environmental assessment and management
Advanced environmental assessment
Principles and practice of environmental assessment
Environmental assessment and decision-making
Environmental impacts
Impact assessment
Environmental evaluation
Environmental management
Environmental planning methods
Environmental impact assessment and environmental planning
Landscape planning and environmental assessment
Planning and project management
Infrastructure planning
Environmental planning
Strategic environmental assessment and sustainability
Strategic assessment and sustainability
Environmental management
Appraisal and audit
Environmental ethics
Environmental policy
Environmental impact assessment and environmental law
Environmental law in Canada
Coastal and marine planning and policy
Agriculture and environment
Common property resources

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. The 32 respondents provided information on 70 courses (or units or modules, as different names are used across countries). Table 3 shows the titles of a sample of individual courses taught by the participants in the survey. 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.

In the remainder of the text, featured results pertain only to those 39 courses labeled EIA, EA, SEA or featuring a close denomination.

Teaching hours

Considering the 39 courses labeled EIA, EA, SEA or exhibiting a similar name, total teaching hours are showed on Table 4. There are two peaks, at 36 and 60 hours, but time spent spreads from as low as 12 hours to as much as 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 indicated that the number of hours per week is usually from 2 to 5, which over a period of 12 weeks lead to totals from 24 to 60 hours

Table 4. Total course hours

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

(average is 44 hours); in some countries, the semester or teaching period is longer and that is why total hours is a better indicator for comparative purposes.

Currently, IA is essentially delivered as classroom courses. When asked if any course is proposed on a distance learning format, only five affirmative answers were obtained. In all such cases, the courses utilize a computer/internet-based learning management system.²

Teaching approaches and tools

After lectures — the classical teaching approach used by all respondents — case studies is the most favored teaching tool, used by 84% of respondents, followed by group discussions, a technique used by 78% of respondents. Inviting practitioners or government officials for lecturing are used by 66% of respondents, whereas role playing is a technique adopted by 41% and field visits have been mentioned by 38%. One university (East Anglia in the UK) has an 'Environmental Assessment Field-course', whereas in the IUAV University of Venice, Italy, two EIA courses include 120 hours of 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 5 summarizes the findings.

Students' assessment

Several kinds of tools are used to assess students' learning and almost all respondents use a variety of tools to fulfill this task (Table 6); only one respondent relies on a single assessment type. However, no assessment tool is universally used. The most popular are written reports, used by 91% of respondents, and written examinations, cited by 84%. The least used tools are tests and quizzes and oral examinations, although oral presentation of practical work is common (66%).

Table 5. Teaching methods and tools

Teaching method	No. of respondents	%
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

Teaching resources

Less than half of the respondents (44%) use a textbook and those who do often adopt their own. Fifteen textbooks on EIA published in five languages were cited by respondents. However, even the educators who recommend a textbook also require students to use 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.

Course contents

The survey presented a compiled list of content topics based on the authors' own experience and on the contents of several EIA textbooks. Respondents were asked to indicate which topics are covered in their courses. Table 7 shows the number of hits each topic obtained. Again, it should be stressed that we did not consider in this part of the analysis those situations where IA content is taught only as part of a broader course. 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. Thus, those data were not analyzed.

The main findings arising from this part of the survey are:

- 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 included by lecturers teaching in other jurisdictions.
- The major components of the EIA process (i.e. from screening to follow-up) receive equivalent

Table 6. Students' assessment tools

Assessment tool	No. of respondents	%
Written outputs (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

Table 7. Content topics of IA courses

Topic	No. of mentions	%
Legal and institutional aspects		
Local/national legislation	36	80
EIA history	34	76
European EIA/SEA Directives	23	51
International Conventions (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
Multicriteria 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

attention by individual teachers in a given course, but not all of the eight components identified in Table 7 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 clear majority of courses, whereas other tools are taught at a maximum of up to 53% of courses.
- EIA is the most frequent type of IA taught, followed by SEA. Most respondents teach SEA as a topic within a broader course on EIA. Three respondents offer separate courses devoted specifically to SEA. Specialized forms of IA such

as risk assessment and life-cycle assessments 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. Environmental management systems appear as a popular topic.

- In terms of scope of application, although respondents were asked to tick an item only if they 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 and less frequently mentioned in EIA courses.

Discussion and conclusions

IA teaching started in the early 1970s in North America and in Europe, when environmental assessment was established as a new multidisciplinary practice and emerged as a research field. Nowadays, it is taught in five continents, both in developed and developing countries.

IA teaching is mainly 'environmental', either as EIA or as SEA. Other forms of IA are a relatively minor part of teaching content. IA is taught at both undergraduate and graduate levels in courses offered in a range of disciplines, most often environmental science, engineering or management, social science, planning and geography. Similar results were reported by Ramos *et al* (2008) for EIA teaching at 37 higher education institutions within Portugal.

IA teaching encompasses both theory and practice. For 53% of respondents, teaching is supported by textbooks — a sign the IA is a consolidated field underpinned by a *corpus* of knowledge, but also by case studies (84%), government or legal guidance (97%) and other practical tools. In addition, a vast majority of lecturers (94%) also use peer-reviewed papers, suggesting that knowledge obtained from research is an input to teaching IA.

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. They found that case studies play a central role in most courses, whereas we found that they are 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 53% of educators adopt a textbook. Additionally, they found that published peer-reviewed papers are relied upon 'to compensate' for the absence of 'good' textbooks, whereas we found that 94% of lecturers require their students to read published articles (without exploring the reasons).

The authors of the Canadian survey expressed a concern that most courses are 'survey-oriented and introductory in nature, with little opportunity to specialize', being compressed into a 12-week period (i.e. possibly ranging from 36 to 48 hours). The Portuguese survey (Ramos *et al*, 2008) found that average teaching hours per week is five (i.e. equivalent to 60 hours over a 12-week period). On the other hand, we found that, on average, an EIA course takes 44 hours, but many universities offer sequential IA courses (i.e. introductory and advanced) spanning over two semesters. In several universities, IA is also taught as partial content in other courses or modules.

Gazzola (2008) summarizes a study of EA-related Master programs in nine European countries. Relevant to our survey is the finding that the only modules 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 7. Ramos *et al* (2008) also found that most courses cover 'the more traditional issues', which we infer also correlate with those in Table 7. In addition, Gazzola (2008) found that EA is rarely taught as a full postgraduate program; out of nine countries, she identified EA as the principal subject in only four countries — France, Spain, Italy and the UK. The first and second countries are not represented in our sample.

In contrast to these papers, which looked at IA 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. Hence, we may have missed IA teaching taking place in several non-English-speaking countries. Moreover, given that EIA procedures exist in more than 100 countries, we would expect there to be other countries where IA teaching takes place that have been missed by this survey. Finally, the overwhelming predominance of environment in IA teaching in this survey may also

reflect IAIA membership, with discussion of other approaches, such as health impact assessment, taking place in other fora. Similar findings about health impact assessment are also reported by Ramos *et al* (2008) in Portugal.

Overall, our study highlights the simultaneous diversity and similarity of IA teaching by IAIA academics from around the world. On the one hand IA can truly be said to be an interdisciplinary subject and this is reflected in 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). These similarities suggest that lecturer exchanges would be viable. This is fertile ground for IAIA members to explore further and to develop exchange networks between academic members accordingly.

Notes

1. <http://www.iaia.org/iaia08perth/cs/session.aspx?id=CS4.2&ts=13>
2. A learning management system is a software providing a digital environment for teaching and learning (i.e. dedicated website platform). It may include tutorials, practical activities, tests and examinations, virtual laboratories and many other tools. Such systems are used both as a platform for distance learning and as a complementary tool for classroom teaching.

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